The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XI. No. 280 OCTOBER 25, 1924 Prepaid Annual Subscription United Kingdom, £1.1.0; Abroad, £1.4.0.

Contents

NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.

***Editorial and General Offices*—8, Bouverie St., London, E.C.4.**

Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines).

Dyestuffs Research and Production

THE controversies which appear almost inseparable from any discussion of British dyestuffs are fortunately absent from the valuable special contributions which we publish to-day. The matter is concerned solely with the research and commercial aspects of the industry, and bears convincing testimony to the progress already made. By a curious accident of selection the three distinguished dyestuff chemists who contribute special articles—each a sample of quite first-class writing—are all associated with the British Dyestuffs Corporation, and their contributions sufficiently indicate the importance of the dyestuffs school of chemistry associated with that body, just as the work the Corporation is doing in actual production is illustrated in its own "Colour Index"—a series of volumes showing the great range and beauty of the dyes actually used in industry. Only the accident of exceptional pressure of work has prevented another contribution which would have been of great interest—namely, an article by Mr. James Morton, the founder of Scottish Dyes, Ltd., on his successful efforts in building up out of nothing a dyestuffs manufacturing section of his business which is recognised as one of the most notable of our post-war enterprises. The Chairman of the Dyestuffs Development Committee, though the results may not be all he could wish, can still point to some remarkable achievements to the credit of those who set out less than ten years ago to make this country independent of foreign supplies. In addition, the notes contributed by a number of dyestuff firms, considerably varying in size, show what a strong group of independent makers, capable of holding their own against competition, the country now possesses. When full allowance is made for aspects of the industry which constantly attrac. criticism, the fact remains that the past ten years have witnessed progress without precedent in the history of the industry.

Turning to the three technical articles, that of Mrs Ronald S. Horsfall, chief colourist to the B.D.C., it one of the most illuminating to the general reader. It is not easy, so intensive has research become, to convey even to the well-informed chemical student, the vast and delicate organisation that functions out of sight. Mr. Horsfall, with the aid of a picturesque style, takes the reader into the dyehouse, and shows him how, instead of being aloof from industry, the research chemist is in the most intimate contact with the actual needs of the industry, and how the whole organisation responds to the practical demands of the user.

Mr. Cecil Hollins, in reminding us that the field, so far as actual new dyestuffs are concerned, is becoming exhausted, points to the fact that a figure of approximately 300 may be taken as representing what may be called "current dyestuffs"; accordingly, it may be assumed that the dyestuffs in use number about one-fifth of the total number which have so far appeared on the market. Probably, therefore, the number of patented dyestuffs materials is some ten times the number of those which have found application in commerce. This fact may seem, perhaps, to be rather discouraging to the research worker intent on making a profitable discovery; but there is not necessarily any great cause for alarm, for if he lights upon something really novel his discovery is more likely than not to be the one valuable patent out of ten.

From the dyestuffs producers' point of view the preparation of colours for use with cellulose-acetate silk is the most interesting proposition at the moment, for the most noticeable difference between these groups and those employed for other textiles is the somewhat limited range of shades. Mr. L. G. Lawrie, who writes on this subject, points out that the number of dyestuffs available is really very few, while as yet there are no satisfactory greens, blacks or browns on the market for the direct dyeing of this particular silk. It was the difficulty of dyestuffs which at first hampered the

progress of this enormously important industry, and, although the cellulose-acetate materials cannot even yet be dyed with the same ease and simplicity as other fibres in general use, some very notable developments have occurred within the past two or three years. In this direction at least there should be a great incentive towards research which will ultimately fill in the gaps in the present range of colours.

Are Research Staffs a Failure?

In nearly every branch of industry there has been, since the termination of the war, almost whole-hearted recognition of the value of research work, so that in whatever direction one may look there is evidence of British manufacturers having instituted research staffs and research programmes with the primary object of improving old methods and products or with the hope of creating entirely new methods and new products. Research departments are, of course, an added and in some cases a very considerable item so far as the working costs of an undertaking are concerned, and one hears so little as to the real commercial utility of these lately instituted departments that it is difficult at the present stage to pass anything in the way of accurate judgment upon them. The average head of a large manufacturing concern would, one would think, be undivided in his opinion as to the necessity for prosecuting research in his own particular line and as to the dividends which would be reaped from *the adoption of such a policy. Now, however, we find* no less an authority than Mr. J. G. A. Rhodin expressing views which, because they are Mr. Rhodin's, must necessarily cause us to re-examine the position, and to consider in particular whether the customary mode of carrying out research—mostly based on the German intensified system—can be applied with success when dealing with the English mentality which demands an incentive, such as promotion, which would seem to be peculiarly absent from the German mind.

Mr. Rhodin contributes to the current issue of *The Engineer* a long and well-reasoned article, in which, after drawing attention to the disappointments of intensified research in this country, he analyses the reasons for failure and outlines the defects which are responsible for the indifferent results, reports of which, he says, have reached him from many quarters. Mr. Rhodin has such opportunities for moving about in close touch with the chemical, metallurgical and engineering industries that one can unhesitatingly rely on his opinions being first-hand and dispassionate, and if there are obvious defects in the research machine it is imperative that they should be made known so that the remedies, if any, can be forthwith applied. It would almost seem, however, that the fundamental difficulty is that as a race we are wrongly constituted for the purpose, and that the stereotyped research organisation lacks any consideration for the bent of the individual Englishman. First, the "machinery" has been transplanted from the Continent, bodily, method and all; and the first principle in German laboratories is to distrust the bulk of the staff, and to trust a very small number only. Mr. Rhodin's point is that, deplorable as it is, the same plan is being attempted in England, and individuals are told off to work out details without any knowledge of the reason why.

Following up his mode of reasoning, Mr. Rhodin arrives at the conclusion that large research organisations are, *per se*, unsuitable for this country, where progress has so far been made by individual effort. This, in the opinion of many, may be considered rather too sweeping a statement, and one would prefer to believe that a more ready solution of the matter would be that of making the conditions of research work more amenable to the English temperament. Research must necessarily be carried on, but it should be quite possible to make the machinery more human, to let the worker share in the value of his discoveries, and to introduce an organisation which reacts to the temperament and creates a spirit of enterprise rather than passive acquiescence and boredom.

Dr. Duisberg on the London Agreement

Dr. Duisberg, in his opening address at the recent meeting of the Union for the Protection of the German Chemical Industry, held at Kissingen, made some interesting observations on the effect of the London Agreement on the German dye industry. He considers that the position will continue virtually the same as it was before the agreement, and to that extent disappoints the German hopes of an improvement. Under the Versailles Treaty the delivery of reparation dyestuffs and pharmaceutical products, which was to cease on January 10, 1925, is to be continued for another 3½ years in consideration for the evacuation of Dortmund. Thus the hoped-for day when the German dyestuffs industry can again enter freely in the open market is postponed for another 3½ years. In this period the French dyestuffs industry, which has by now become firmly established after a considerable struggle, will be a much more formidable competitor, and he adds that from what he has seen they will make good use of the time. Agreements with the French concerns, he considers, are essential, and quite possible, but he goes on to point out that not only in France has there grown up an efficient industry producing dyestuffs and dye-intermediates, but in Great Britain, the United States and elsewhere the manufacture of dyes has been actively encouraged by protective measures. Added to this the Germans will not, he states, be able to produce chemicals, and particularly dyes, so cheaply as they used to do, so that the sale of these in foreign markets will not be the easy operation it was before the war, but will become very much more difficult. The Dawes scheme falls unduly heavily on the German chemical industries not only in requiring delivery of reparation dyes and allowing competing industries to develop abroad, but also in the fact that the chemical and nitrogen industries will be called upon to find an undue proportion of the revised indemnity. He has a hope that this last matter may be revised, but he emphasises that the German people, who are noted for their industrious character, must work and develop these industries, in which he says they were the pioneers, so that they may continue to hold their rightful place in the world's markets.

Chemicals in Foods

THE Departmental Committee appointed last year to inquire into the use of preservatives and colouring matter in food have reached what will generally be regarded as sound conclusions, and the new and perfect Government now in course of being elected will have an opportunity of doing a useful service by putting its recommendations in force. Generally the Committee agree with the view to which chemical opinion has been steadily moving that all food and drink should be free from preservatives, except in "a few definite and specific cases." For these, it is suggested, two preservatives only should be permitted—benzoic acid and sulphurous acid and their salts. The Committee also recommend that the use of any preservatives in foods should be accompanied by a declaration of the nature and amount of preservative present.

In the report the term "preservative" does not include salt, saltpetre, sugar, vinegar, acetic acid, alcohol, spices, or the agents introduced into food by the process of curing known as "smoking." It is used as meaning "any other substance which, when added to food, has the property of preventing, arresting, delaying, or masking fermentation or putrefaction of food." The preservatives at present in use are divided into three classes—(1) Formaldehyde and its derivatives and the fluorides; (2) boric acid and salicylic acid and their salts, which are less undesirable than the first group; and (3) benzoic acid and sulphurous acid and their salts, which are described as *the least harmful. The Committee insist that, if used* at all, the preservatives should be selected from the last and least harmful group. This would exclude the use of boron preservatives, largely employed in butter, margarine, and other foods, and salicylic acid and its salts, mostly used in beverages.

Family Chats

MR. WOOLCOCK resumed his presidential visitation of the Sections of the Society of Chemical Industry this week, visiting Leeds on Monday and Edinburgh on Tuesday. Both these gatherings, we imagine, took the form of family chats, during which questions of policy, administration, finance, etc., could be discussed with a frankness and in detail impossible at more formal gatherings. The idea seems to us an excellent one. As Mr. Woolcock will find, especially in the North—though he probably knew all about it long ago—there is a "provincial" view which is always a little suspicious of too much control from London. It applies to nearly all national organisations with their headquarters in the capital, and sometimes the London official class, immersed in their own work, fail a little to appreciate the outside point of view. By taking the distant sections into his confidence the President will be serving the Society in two ways—he will be stimulating the local branches by recognising their important place and work and dispersing from their minds any erroneous theory of a London "family party"; on the other hand, he will bring back to headquarters a store of refreshing ideas and experiences and remove any danger of the insulation of the Society's official life from these activating outside influences. And all will agree that no one could do this liaison work better.

An Interesting Appointment

THE interesting announcement is made in another column that Dr. A. T. de Mouilpied, of the British Dyestuffs Corporation, and formerly Lecturer in Chemistry in the University of Liverpool, has been appointed to a professorship of science in the Royal Military Academy, Woolwich, and will take up his new duties at the end of January. Dr. de Mouilpied's departure from the staff of the British Dyestuffs Corporation will be generally regretted. In addition to being closely associated with technical research work there, his services have been of value in many other directions, particularly in making available information respecting the industry of a sound educational character. Fortunately the exceptional knowledge and experience gained by Dr. de Mouilpied in his association with the dyestuffs industry will not be lost. At the Military Academy at Woolwich one may imagine many ways in which his specialised internal knowledge of the whole science and machinery of dyestuffs production will be a very valuable addition to his academical qualifications.

Points from Our News Pages

A number of contributions are published dealing with the present position of the British Dyestuffs Industry.

Mr. Ronald S. Horsfall, M.Sc., Chief Colourist to the B.D.C., writes on the internal organisation of research and its intimate relation to the needs of the consumer (p. 412).

Recent developments in dyestuffs for cellulose-acetate silk are reviewed by Mr. L. G. Lawrie, Head of the Dyehouse Research Department of the B.D.C. (p. 414).

Mr. Cecil Hollins, B.Sc., describes the important part which Heterocyclic Systems play in dyestuff chemistry (p. 416).

The Chairman of the Dyestuffs Development Committee (Mr. W. J. U. Woolcock) briefly reviews the progress made in the period 1914–24 (p. 418).

Reports are contributed by several British dyestuff firms indicating the progress made during and since the war (p. 419).

A new scheme of reconstruction of the Magadi Soda Co., Ltd., has been approved by the creditors (p. 422).

"Catalysts in Carbonisation" is dealt with by Dr. Lessing in a Chemical Society paper (p. 422).

Our London market report reveals a slightly better demand in the home trade and export business is brisk (p. 430). The Scottish market is possibly affected by the political situation and last week's improvement is not maintained (p. 433).

The Calendar

Oct.		
27	Chemical Industry Club: Annual General Meeting.	2, Whitehall Court, London
28	Sir John Cass Metallurgical Society: General Discussion, "Laboratory Practice."	London.
29	Institute of Physics: "Electrical Precipitation." Sir Oliver Lodge. 5.30 p.m.	Institution of Electrical Engineers, London.
29	Society of Chemical Industry (Newcastle-on-Tyne Section): "The Oppau Explosion, 1921." Professor W. N. Haworth.	Armstrong College, Newcastle-on-Tyne
29	Leicester Literary and Philosophical Society (Chemistry Section): General Business Meeting of the New Section. 8 p.m.	The Museum, New Walk, Leicester.
29	Society of Chemical Industry (Nottingham Section): Joint discussion on Textiles with the Faraday Society. Tea 5 p.m., introducing papers from 5.30 p.m.	University College, Nottingham.
30	Society of Dyers and Colourists (Midlands Section): "The Dyeing of Leather." Mr. M. C. Lamb.	University College, Nottingham.

An Inside View of Dyestuffs Production

By Ronald S. Horsfall, M.Sc.

(Chief Colourist to the British Dyestuffs Corporation)

By a rare combination of scientific knowledge with the qualities of imagination and humour, the author presents an instructive and interesting picture of the problems of dyestuff production, from what may be called the Dyehouse point of view. He shows, too, how largely the work of all branches of the industry is influenced by the practical needs of the consumer.

To a chemist not associated with the industry the announcement of the discovery of a new dyestuff must cause considerable wonderment, not so much because of any scientific achievement which it may represent, but rather because of the almost monotonous regularity with which the event occurs. The rhyme concerning the old lady who lived in a shoe must appear to him a singularly appropriate description of the dyestuff industry. A red, a blue, and a yellow, and their admixtures should suffice for the production of most hues, and if the number be extended to a round dozen surely these should be ample for all purposes! That new discoveries might lead to the replacement of the individual members of the round dozen by others which offered some advantage, either in brilliancy of hue, ease of application, or price, one can readily understand; but how can one appreciate the need for new dyestuffs after noting in some modern dyestuff census that the number of different chemical individuals already available is now out of the hundreds and into the thousands?

The explanation which would most readily occur to one of such an apparently absurd state of affairs would probably be summed up in the word competition, and if this is not limited to the narrow sense of competition betwixt the various dyestuff manufacturers, then it would approximate very closely to the truth.

The Influence of Competition

Competition, yes! Competition among the individual dyestuffs for a place in the sun, or out of it as the case may be; the greater competition of the manufactured articles which it is their function to colour; and even the competition of the very fibres themselves whose province to-day is undergoing a peaceful colonisation—a process only too well known in human progress as preliminary to the partial, if not total, elimination of the originals.

The competition of the dyestuff manufacturers and the competition of the individual dyestuffs, for use in some established phase of industry, are so interwoven that it is almost impossible to separate their influence on the production of new colours, but the driving force is clearly the monopoly conferred by a patent on the patentee. This monopoly is limited to the extent that the original problem calling forth the patent (which problem for example might be the colouring of some substance to a certain shade having fairly definite properties, and at a more or less definite cost) is usually capable of more than one solution, and in this way a later and better solution than the original may bring about the transfer of a monopoly from one dyestuff manufacturer to another; or at the very least it will bring about the sharing of the monopoly.

The latter statement will be more clearly understood by considering the case of a navy blue shade on cotton for English consumption. Only a few years ago the only satisfactory dyestuff available was Indigo; to-day through the advent of such competing dyestuffs as sulphur colours, diazotised and developed colours, vat colours and azoic colours, its sway has shrunk considerably. And it is to be noted that the most successful manufacturers of the competing products are those who do not share in the Indigo monopoly.

On the production of new dyestuffs many aspects of the patent question have no bearing whatever, but as a whole it is nevertheless of such importance—embracing as it does possible monopoly in a certain field, knowledge of the lines on which competing manufacturers are working, and suggestions for use in other fields of endeavour—that every large firm has its own patent department staffed with men who are not only chemists but who also possess a mentality sufficiently legal to assure that they write what they mean and mean what they write.

It is, however, the competition of the many articles in which colour is an essential, if small, ingredient that is the chief cause of the constant additions to the numbers of new dyestuffs. Can you call to mind any material which does not embrace some added colouring matter? It is easier to think of those which do; the "white" paper now before you, probably the printing ink itself, your pipe, the chair in which you are sitting, silk, wool, cotton, linen, leather, paper, paint, furs, straw, rubber, artificial silk, leather, or ivory, cinema films, smoke signals and antiseptics, the sausage you had for lunch, or, if you are fortunate, the crême de menthe you had as a liqueur! And then think of the thousands of brains employed in such industries, the restless striving for commercial success, the perfection of wonderful and ingenious machines; and at the end all dependent on the supply of colour which can be applied to the material, or by the process which has been so laboriously evolved.

An Infinite Range of Application

Think also of the need for dyestuffs soluble in water and insoluble in water; soluble in some individual organic solvent and insoluble in water; soluble in water and insoluble in some individual organic solvent; to be applied at ordinary or boiling temperatures; to withstand washing and light; to withstand manufacturing processes such as carbonising, milling, potting, mercerising, cross-dyeing and vulcanising; to have such a large affinity for a fibre that the darkest shades may be dyed; to have so little affinity for a fibre that an ounce of dyestuff may be evenly distributed over hundreds of pounds of material; to be used in machines constructed of iron, copper, or other metal without being affected; to be fast to acid or alkali as the case may be; volatile and non-volatile—there is literally no end to the list of properties one or more of which a dyestuff must possess in order to meet the special need of someone.

It has been said that there was never a dyestuff yet discovered which would not meet somebody's need if that need were only known, and it is the realisation that this statement is close to the truth, which has led to the elaborate selling organisations of the leading dyestuff concerns. Salesmen everywhere, at home and abroad, not only selling dyestuffs but reporting to headquarters the various needs of the dyestuff consumer; technical representatives—specialists in some phase of colour application—ready to leave at a moment's notice to assist any consumer who may have some colouring problem to solve; large laboratories, expensively equipped and staffed with colourists, chemists, and physicists grouped as the dyehouse department (a name, by the way, reminiscent of simpler days); the whole organisation at the service of the consumer. Here—a chemist engaged solely on the identification of dyestuffs; selling names have no terrors for him; he has his own index, so expert and so sure that not only is he able to identify in an almost incredibly short time the individual components of a three or four colour mixture, but in some cases, in the identification of the colour he is incidentally able to recognise the factory from which it emanated. There—a physicist determining and recording complex physical details concerning dyestuffs, their solutions or suspensions; his part of the work in the elucidation of the problems which never grow less in number. Everywhere—specialists in some phase of colour application, textile, leather, calico printing, lakes or paper; so diverse is the art that to be master of even one phase is a considerable achievement.

For all matters concerning the quality, tinctorial value, properties and methods of application of dyestuffs in general, the dyehouse department is the clearing house. It is also the exchange in which the dyestuff consumers' bids and the dyestuff manufacturers' offers are dealt with; such bids and offers being recorded with the meticulous care which characterises an exchange engaging in any other commodity. The majority of consumers' bids received through the sales department in the form of inquiries are met by an offer of a colour already on the selling list; a few entail some slight modification, possibly entire freedom from soluble inorganic salts, and the services of the works department are called upon. The specifications with this inquiry could only be met by the offer of a dyestuff

which is the patented monopoly of a competitor. But at last here is one embodying a new idea in the application of colour. Few, if any, of the dyestuffs now on the market could be considered as being other than makeshifts; so obviously this becomes a matter for the research department and will eventually result in the announcement of new dyestuffs.

The Function of the Research Chemist

The question as to how far it is possible for a dyestuff research chemist to design a dyestuff to meet certain specifications immediately suggests itself. If the problem is clearly and scientifically stated he can do much; he can define the type of chemical individual within fairly narrow limits, and he can in certain cases modify the hue or solubility, but the fact remains that close chemical relationship does not confer the same characteristics upon the individuals enjoying it with any more certainty than does blood relationship in human affairs.

There is thus a large element of chance connected with research, and partly for this reason, but largely because the patent literature gives no indication of the fields which have been drawn blank, it is almost certain that the same ground is gone over independently by the different factories; but—and this is important—very often with a considerable interval of time and with a corresponding change of methods and ideas between the investigations. It thus comes about that a constant stream of samples of dyestuffs, representing combinations of known intermediates and their derivatives, flows from the research into the dyehouse department for investigation by its colourists in the light of the known needs of the consumer. As a case in point, even allowing for the lapse of time, it seems almost incredible that such a valuable dyestuff as Caledon Jade Green should have been discovered by Scottish Dyes, Ltd., in a field which there was every reason to assume had been thoroughly explored by the German chemists.

These statements might suggest that dyestuffs research is to a great extent carried out on the lines of trial and error, and in so far as we are speaking commercially of the discovery of new dyestuffs it is a fairly true suggestion. But the yield of the new dyestuff in the first instance may only represent a fraction of the theoretical yield, and the cost of manufacture may therefore be so high that it renders its commercial exploitation impossible. An intermediate may have been used which is not being manufactured in this factory, or the intermediate may be entirely new; there may be no suitable plant available for the manufacture of either intermediate or dyestuff, and it is the efficient, scientific, and ordered research on such perfectly definite problems which determines the commercial success of a dyestuff factory.

The Commercial Aspect

It is, however, the commercial aspect which is largely responsible for any suggestion of chaos in dyestuffs research; chemically it is in perfect order, the fields are quite definite, the lines of development fairly clear, the steps taken in the making of new dyestuffs from a new intermediate almost routine. Yet, although most admirable and brilliant chemical research may result in bringing forth a large number of new dyestuffs, it may not bring forth a single one which meets the need of the consumer, and for the moment at any rate no commercial exploitation is possible. As an example of how new and valuable dyestuffs have appeared from one source in a perfectly logical sequence over a period of 55 years, the following may be instanced. The synthesis of Alizarine in 1868 was followed by the preparation of simple derivatives; new anthraquinone derivatives were followed by the appearance of the important class of so-called acid alizarine colours for wool dyeing, and later by the anthraquinone vat colours.

The latest (1923) dyestuffs from this same field are the amino-anthraquinones for the dyeing of Celanese silk.

Hence it is doubtful whether any field of dyestuff research is ever permanently closed; sometimes its logical development synchronises with new needs, occasionally it is ahead in point of time, in which case unless the factory has enormous faith in its products, and is prepared to expend large sums on the artificial creation of a demand, no commercial exploitation is possible; but usually the development follows the demand.

The Fibres Themselves

There is just one other important influence to discuss; and that is the competition of the fibres themselves. Two instances will suffice. One of the hall marks of civilisation is the wearing of clothes, and it has been suggested that a few mannequin parades would bring about the subjugation of a savage tribe more thoroughly and more cheaply than the methods now in vogue. However this may be, the authorities in a civilised country insist upon the wearing of clothes by its people; fortunately for many not in its immediate employ, the cut, the hue, and the material are not definitely specified, although the Londoner as representing the seat of government does his best. It may be that an individual appreciates fully the advantages of a suit of all wool, but unfortunately he has not the means to purchase one; he can, of course, purchase the cast-off clothing of his more fortunate brother, but he prefers new, and, further, he prefers new of as nearly as possible the same hue as that of the all-wool suit. What is to be done? As wool is too dear, some manufacturer finds that it can be supplanted in part by cotton, a cheaper fibre. The dyeing of all-wool material and the dyeing of all-cotton material are two different processes involving the use of two entirely different classes of dyestuffs. Evidently, then, for the dyeing of this mixed material some new dyestuffs are needed; dyestuffs which will simultaneously dye wool and cotton the same shade by the same dyeing process, and in due course such dyestuffs do in fact appear on the market.

Again, the placing on the market of new fibres such as Viscose or Celanese creates new dyeing problems. Particularly is this the case with Celanese, an acetyl cellulose for the dyeing of which only a very few of the dyestuffs used for dyeing other materials are even partially satisfactory. In the first search through available dyestuffs for satisfactory material certain facts appeared which seemed to indicate that it was necessary that certain chemical groups must be present in the molecule. The later search through the known chemical substances, not necessarily market articles, resulted in the patents of Clavell and the British Celanese Company covering the use of a wide series of products, and the patents of the British Dyestuffs Corporation covering the use of the omega sulphonic acids of bases and of amino-anthraquinones. The next normal and logical development will be the appearance of new dyestuffs.

The whole question is thus largely one of demand and supply; generally speaking a definite need for a dyestuff having certain properties will eventually result in its appearance on the market. Such a definite need can usually be supplied by dyestuffs having very widely differing chemical constitutions, and in so far as the need is not patentable, the monopoly conferred upon a dyestuff manufacturer by some patented dyestuff is only of limited value. The discovery of new dyestuffs with hitherto unheard of properties, as for example, anthraquinone vat dyestuffs, may lead to the creation of a demand which did not previously exist, but it is a slow and expensive matter, and in any case very exceptional. Usually the demand is the forerunner of the supply. Although there are many dyestuffs which are described as obsolete, yet the tendency is towards a rapid increase in numbers; and in view of the ever-increasing uses to which dyestuffs are being put there seems to be no prospect of any change in the position for some time to come.

Transport Reform

To the Editor of THE CHEMICAL AGE.

SIR,—The vitally important question of transport reform is not considered a good election cry by the politicians, yet everything we need from the cradle to the grave has to be moved upon a wheel and axle. Many people believe that machinery is of no benefit to the workers; yet, the increase of our population from 20 to 47 millions owes its existence to the locomotive. The only remedy for unemployment, for low wages, for foreign competition which shuts the native product out of the home market, is more, and yet more, machinery. If we had automatic machinery for the sorting of goods, and for the loading and unloading of goods trains, and ships and barges, the cost of transport could be reduced to one-fifth of its present level. Those engaged in the production of coal, iron, machinery, building material and farm produce can appreciate what a wholesome revolution this would bring about.—Yours, etc.,

MALCOLM MACPHERSON.

Hon. Secretary, Transport Reform Society,
26, Clarges Street, London, W.

Recent Developments in Dyestuffs for Cellulose-Acetate Silk

By L. G. Lawrie

(*Head of the Dyehouse Research Department, British Dyestuffs Corporation*)

The author reviews recent developments in the study of colours for the dyeing of cellulose-acetate silk, and comes to the conclusion that the future will bring forth a sufficiency of colouring matters of all kinds to meet the commercial demands of the new fibre.

RESEARCH on dyestuffs has been given an impetus along somewhat novel lines by the demand for colours capable of dyeing cellulose-acetate silk,* a fibre recently marketed for which the majority of dyestuffs have little affinity. The valuable textile properties of this material and the increasing use of artificial silks in general were responsible for the endeavours which have been made to overcome the dyeing difficulties which at first hampered the development of this silk. Cellulose-acetate silk cannot even yet be dyed with the same ease and simplicity as can the other commercial fibres, although very considerable improvement has recently been made and several different groups of dyestuffs are now available, which, though they may be incomplete in some respects, are a great advance on what was possible two or three years ago.

Early research work on the dyeing properties of cellulose-acetate silk, noticeably by Clavel,† showed that the affinity of a dyestuff for this fibre was roughly proportional to its basicity. This is shown by the fact that the basic colours are the only class of dyestuffs all of whose members have some affinity for acetate silk. Again, the fibre is capable of absorbing readily such bases as benzidine, dianisidine, paraphenylenediamine, etc., and these bases containing a free amino group can then be diazotised and developed on the fibre with the formation of insoluble azo compounds. In the same way dyestuffs containing one or more basic groups, not masked by other groups of an acid nature, show a distinct affinity for the silk and as a rule dye it readily from their solutions at a relatively low temperature.

At the same time it was noticed that the sulphonic acid group had a very powerful restraining action on the dyeing properties of the colour, only a few dyestuffs possessing one sulphonic acid group having any affinity for the silk and none at all dyeing it which possess two or more such groups in the molecule. At the same time Clavel attempted to show a connection between the affinity of a dyestuff and the presence of certain so-called "active" radicles, viz., the hydroxyl, amino, imino, imide, nitro, nitroso, isonitroso, acetylamino and azo groups. His theories have been further extended and somewhat modified in a series of articles which have recently appeared in the "Revue Générale des Matières Colorantes."‡ By a judicious selection of such compounds containing basic or other favourable groups, a range of dyestuffs was obtained which acted as a "stop-gap" until a more satisfactory series should be forthcoming.

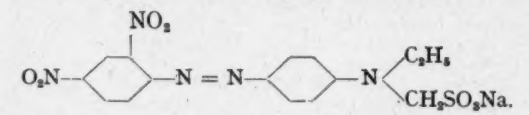
Numerous experiments on the above lines showed that dyestuffs containing an amino group, the basic properties of which were not masked by other groupings and also containing no sulphonic acid group were the most satisfactory for dyeing acetate silk. The great majority of these colours are, however, insoluble. The solubility of most of the dyestuffs on the market is obtained by the introduction of sulphonic acid groups which are inadmissible in this case, and subsequent research has almost exclusively been directed towards so modifying these insoluble basic compounds as to render them suitable for dyeing the silk. This has been satisfactorily accomplished in two different ways. Firstly, by rendering them soluble by the introduction of "solubilising" groups into the molecule other than the sulphonic acid group, and secondly by dispersing them so that they form very finely divided suspensions or colloidal solutions.

Dealing with the first method we find that the solubility of amidoazo and other compounds has been effected in three different ways, by the introduction of an omega sulphonic acid group, as with the ionamines; by forming the bisulphite compounds of the dyestuffs; and lastly by using the carboxylic acid group to confer solubility on the molecule.

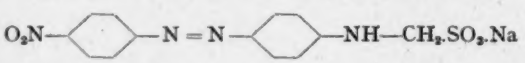
The first new range of dyestuffs for dyeing acetate silk was the ionamines which are the omega sulphonic acid compounds of amidoazo bodies, etc. The use of these compounds for dyeing was the discovery of Professor Green and K. H. Saunders*; omega sulphonic acids of amido bodies could be prepared which were soluble and which could be hydrolysed in the dyebath to give rise to the corresponding amino compounds from which they were prepared, which when liberated were instantly taken up by the silk. The silk is therefore really dyed by the base which is liberated in a kind of "nascent" form. This hydrolysis can be effected in either acid or alkaline solution and sometimes by simply heating a solution of the dyestuff. Thus a primary amine such as amidoazobenzene omega sulphonic acid, on hydrolysis liberates the base amidoazobenzene together with formaldehyde bisulphite:—

$$C_6H_5.\ N=N.\ C_6H_4.\ NH—CH_2SO_3Na \rightarrow C_6H_5.\ N=N.\ C_6H_5.\ NH_2$$

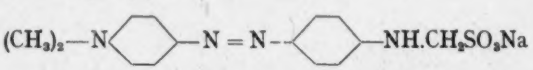
The base dyes the fibre and can be subsequently diazotised and developed to give a further range of shades when coupled with naphthols, etc. Further research led to the production of direct red dyestuffs from secondary amines such as:—



These dyestuffs can also be divided into two classes according to whether they contain one salt-forming group as with



or two such groups as:



In the former case they are more stable and need acid for effecting their hydrolysis, but in the latter case hydrolysis can take place by simply heating the aqueous solution.

This property is of importance when the dyestuffs are to be used together with direct colours for the dyeing of cotton and acetate silk union material, as in this case an addition of acid to the dyebath may be injurious to the cotton. Further developments were made with this range of dyestuffs by coupling diazo or tetrazo compounds with omega sulphonic acids derived from secondary amines and aldehyde bisulphites or by diazotising diamido-methylomegasulphonic acids and coupling the diazo compound so obtained with the usual dyestuff components whilst retaining the methylomega-sulphonic acid group.

It has been found impossible, however, to obtain satisfactory direct blues from the azo series, but an interesting extension of the principle of forming omega-sulphonic acids to the anthraquinone group resulted in a further range of shades including both greenish and reddish blues, obtained either from the amido anthraquinones or their derivatives.†

Following the discovery of the ionamines the Badische Co.‡ suggested the use of the water-soluble bisulphite derivatives of insoluble or difficulty-soluble azo colouring matters. For

* Several different types of cellulose-acetate silk have been made by various firms from Bayer in 1904 to the present product of the British Celanese Co. All these may roughly be divided into two classes, the fully acetylated product which is of minor value at present, and the partially acetylated or hydrolysed product—the Celanese of British Celanese Co. It is the latter product which is dealt with in this paper.

† B.P. 182,830. Wilson, J.S.D.C., 1920, p. 311. Briggs, J.S.D.C., 1921, p. 287.

‡ 10/1923; 11/1924; 6/1924.

* B.P. 200,873, 212,029, 212,030. Green and Saunders, J.S.D.C., 1/1924; 5/1924.

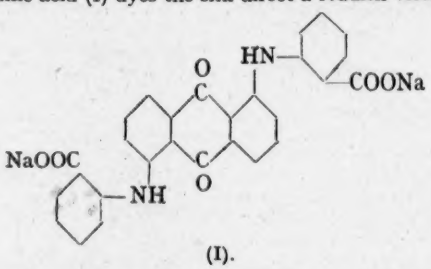
† J.S.D.C., May 1924, p. 138.

‡ B.P. 204,280.

instance, the bisulphite compound of aniline-azo-beta-naphthol can be dyed from a weakly acid bath and gives a golden-orange shade.

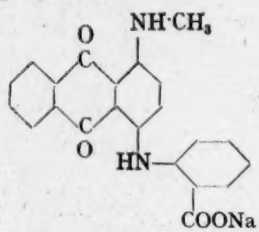
Another interesting series of dyestuffs has been prepared by Baddiley, Hill and Anderson* in which the requisite solubility of the dyestuff has been obtained by means of introducing carboxylic acid groups into the molecule, according to their "carboxy" rule, which states that "dyestuffs containing carboxylic acid groups but no sulphonic acid groups possess an affinity for acetyl silk." In the first patent (*q.v.*), carboxylated aminoazo dyestuffs containing no sulphonic acid groups were suggested. Such compounds as *m*-aminobenzoic acid + *o*-anisidine; *p*-aminosalicylic acid + α-naphthylamine; 5-acetylamino-2-amino-4-methoxytoluene + β-oxynaphthoic acid (hydrolysed); *m*-aminobenzoic acid + 1 : 2 aminonaphthylamine ether being employed. These dyestuffs are capable of being diazotised and developed on the fibre to produce a further range of shades when coupled with naphthols, etc. Later the "carboxy" rule was applied to the amidoanthraquinones † and it was found that dyestuffs of this class also, containing carboxy groups but no sulphonic acid group dye acetyl silk directly. From compounds of this type are obtained shades at the blue end of the spectrum unobtainable from the azo series. In addition these compounds possess the excellent fastness properties usually associated with the anthraquinone dyestuffs.

These anthraquinone dyes can be obtained, for example, by the condensation of an aminoanthraquinone derivative with the sulphochloride derivative of salicylic acid or by the condensation of a halogenated anthraquinone with a suitable amino-carboxylic acid. Thus 1 : 5 dichloranthraquinone + anthranilic acid (I) dyes the silk direct a reddish-violet shade.



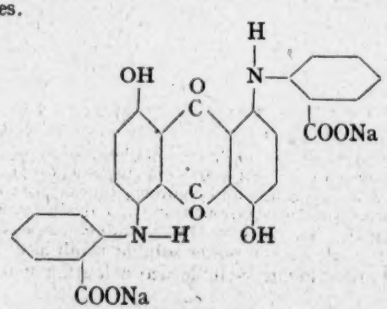
(I).

Again, 4-brom-1-methylaminoanthraquinone + anthranilic acid (II) dyes bright reddish-blue shades



(II).

and dichloranthrarufin + anthranilic acid (III) gives greenish-blue shades.

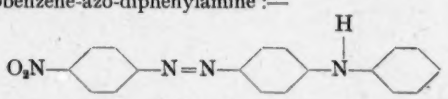


(III).

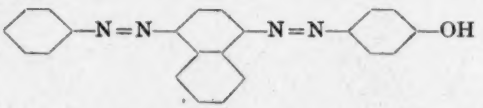
* B.P. 202,157.
† B.P. 207,711.

These colours also can be quite simply applied to acetate silk by dyeing from a slightly acid bath, when bright shades of very good fastness, especially to light and washing, are obtained.

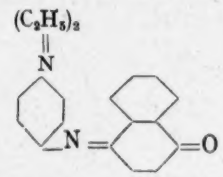
The second line of investigation, that of transforming the insoluble dyestuff into the colloidal or semi-colloidal state is a most interesting development of dyeing chemistry. This method of "dispersing" a dyestuff and utilising it in the finely-divided or "colloidal" state is described in a recent patent by British Celanese and Ellis* and in a recent communication to the Society of Dyers and Colourists by the latter.† The method adopted is to disperse the insoluble or difficulty-soluble dyestuff by heating it with turkey red oil, sulphonated ricinoleic acid or some similar substance and pouring the thick paste so produced into water. The dyestuffs are so thoroughly dispersed in this way that many of them appear to be in solution and show a remarkable degree of stability in the absence of electrolytes. The acetate silk can be readily dyed from these dispersions either with acids or alkalis. A very varied selection of dyestuffs is suitable for treatment by this process, the members of which are drawn from a large number of different classes of compounds. Thus amongst the azo compounds we can use monoazo dyes such as *p*-nitrobenzene-azo-diphenylamine :—



which dyes an orange shade; or a diazo colour dyeing a gold shade can be obtained from benzene-azo-naphthalene-azo-phenol.



Simple amino basic compounds such as benzidine, dianisidine, etc., are easily dyed by this method and can be further diazotised and developed on the fibre. The unreduced indophenol, diethyl-p-amidophenyl-1 : 4-naphthoquinone-monoimide



is taken up very readily by acetyl silk from a colloidal solution prepared as above and gives deep rich shades of blue. Other compounds which can be used are drawn from the diphenylmethane group such as rosaniline base, triamino-tripenylcarbinol; malachite green base, tetramethyldiamido-triphenylcarbinol; from the azine dyes such as safranine base, from the thiazines as represented by methylene blue Base, as well as many miscellaneous colours derived from other groups.

The fact that anthraquinone dyestuffs and their derivatives could be used in the colloidal or dispersed state for dyeing acetate silk was the invention of Baddiley and Shepherdson and forms the subject of a patent.‡ The following are a number of compounds mentioned in the patent as being suitable for dyeing in this manner :

1-aminoanthraquinone	Yellow.
1-amino-2-methylanthraquinone .	Yellow-orange.
1-methylaminoanthraquinone	Red.
1 : 4-diaminoanthraquinone	Violet.
1 : 5-diaminoanthraquinone	Red.
Diaminoanthrarufine	Blue.
1 : 4-amino-oxyanthraquinone	Crimson.

These dyestuffs can be applied to the fibre by "dispersing" them with sulphonated recinoleic acid or other suitable dis-

* B.P. 219,349.
† J.S.D.C. xl. 9,285.
‡ B.P. 211,720.

persing agent giving shades ranging from yellow to blue of exceptionally good fastness properties and very good affinity.

It will be seen from the above notes that quite a number of new colours or colours prepared in a novel manner are available for dyeing cellulose-acetate silk, all of which can be applied easily from water solutions or dispersions and give shades of varying degrees of fastness ranging from those of moderate fastness properties to those of extremely good fastness such as the anthraquinone colours. The only noticeable difference between these groups of dyestuffs and those capable of being used for the other textile fibres, apart from the number available, is the somewhat limited nature of the range of shades. These are yellow and orange shades in abundance and a satisfactory selection of reds, but the number of blue dyestuffs available is very few, and there is as yet no satisfactory green, brown or black dyestuff on the market for the direct dyeing of this silk.

At the same time there appears to be no doubt that with the large amount of research work which is now being done in connection with dyestuffs for acetate silk, that the future will bring forth a sufficiency of colouring matters of all kinds to meet the commercial demands of this new fibre.

The Importance of Heterocyclic Systems in Dyestuff Chemistry

By Cecil Hollins, B.Sc., A.I.C., F.C.S.

In the following article Mr. Hollins, whose book on the "Synthesis of Nitrogen Ring Compounds" was recently reviewed in these columns, indicates the important rôle of heterocyclic systems in the building up of dyestuff molecules. The article contains some useful pointers for dyestuff research.

It is generally recognised that compounds of the azo type constitute by far the largest single class of dyestuffs. Of the 1,230 synthetic colouring matters described in the *Colour Index*, no fewer than 640, or 52 per cent., are azo compounds. Nine-tenths of these are derivatives of more or less simple aromatic amines and phenols containing only homocyclic systems—*i.e.*, they are derived from benzene and naphthalene. This preponderance of homocyclic azo dyestuffs is due in the main to the easy accessibility and comparative cheapness of their components and to the simple nature of the processes of diazotisation and coupling by which the colouring matters are produced. A glance through the patent files of recent years shows, however, that although interest is still active in the discovery of new components and new azo combinations, the field is becoming exhausted, and it is increasingly difficult to hit upon any valuable addition to the long list of known azo colours.

Attention is therefore naturally directed to other classes of dyestuffs, and here we find at once that heterocyclic compounds—*i.e.*, derivatives of ring-systems which contain other atoms than carbon (usually nitrogen, oxygen or sulphur), are of first importance. There is reason to suppose that the sulphur colours are complex compounds containing carbon-sulphur or carbon-nitrogen-sulphur ring-systems. Including these, the heterocyclic dyestuffs given in the *Colour Index* number 422, as compared with 579 homocyclic azo dyestuffs and 229 of all other homocyclic classes.

The heterocyclic colouring matters may be divided into the following groups in order of numerical importance :—

Sulphur colours	80
Azines	65
Azo colours	61
Oxazines	44
Pyronines	44
Indigos	33
Thioindigos	21
Acridines	20
Quinolines	20
Thiazines	13
All other types	21
Total	422

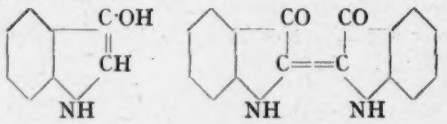
Naturally these figures refer only to those commercial dyestuffs the derivation of which has been made public. The identification of some types of colour is more difficult than that of others, but it is not far from the truth to say that less than 10 per cent. of the dyestuffs now upon the market are unrepresented in Schultz' *Tables* and the *Colour Index*. It is more difficult to distinguish what proportion of "known dyestuffs" are actually in use at the present time. Not only does the dyer follow (or create) popular fashion in the matter of shade, but he has private fashions of his own in the manner and processes of dyeing. It is usual to adopt the figure of approximately 300 as representing what may be called "current dyestuffs"; so that it may be assumed that the dyestuffs in use number just over one-fifth of the total dyestuffs which have so far appeared upon the market.

In parenthesis, it may be remarked that the number of patented dyestuffs is at least ten times the number of those which have found their way into commerce. This proportion is probably considerably exaggerated by the flood of more or less worthless patents which follows always upon the discovery of some new line of attack or of some novel type of dyestuff. The research chemist need not be alarmed, therefore, at the thought that only one out of ten patents results in a commercial dyestuff. If he has discovered something really novel his is more likely than not to be the one valuable patent of the ten.

As has been mentioned, the sulphur colours are probably heterocyclic in nature, but since in no single instance has a constitution been definitely made out little remains to be said about them here. It seems to have been the usual custom to submit to the "sulphur melt" or "sulphide boil" each moderately simple dyestuff intermediate as discovered, and compounds otherwise useless have sometimes been converted into quite useful sulphur colours. In much the same fashion fusion with alkali has become an empirical method for the production of vat dyestuffs from more or less uninteresting anthraquinone derivatives.

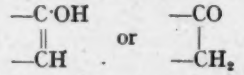
For the purposes of this article the heterocyclic dyestuffs of known constitution may conveniently be grouped according to the nature of the heterocyclic systems involved. With a few exceptions (notably the thioindigos and the pyronine group) these all contain nitrogen as a member of the hetero-ring.

Simple **indole** derivatives, such as indole itself, indoxyl, isatin, etc., are practically colourless and without affinity for the fibre. The doubling of the indoxyl molecule by oxidation gives the intensely coloured Indigo, which may be dyed upon the fibre by vatting.



Indoxyl Indigo

There are no less than 23 simple derivatives of Indigo on the market, and in addition there are the more or less obsolete indirubins and also the valuable Alizarin Indigos made by the condensation of isatin chloride or anilide with homocyclic compounds which, like indoxyl, contain the grouping

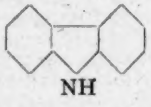


The Ciba Violets and Helindone Browns are made from isatin and thioindoxyls.

The **thioindigos**, in which sulphur replaces the .NH. groups of indigo, are numerically not less important than the indigos,

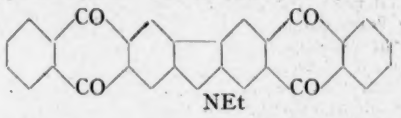
and the range of shades covered is considerably wider. It is only necessary to mention Thioindigo Red, Ciba Bordeaux, Helindone Scarlets, Helindone Orange and Thioindigo Brown.

The **carbazole** ring-system—



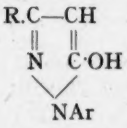
—presents much more limited possibilities than that of indole, but these have by no means been exhausted. Diaminocarbazole was for a short time tried as a base for disazo colours, but these, owing probably to the position of the NH_2 groups *meta* to the diphenyl linkage, had no substantive properties and were without interest. The carbazoles produced from γ- and J-acid by treatment with phenylhydrazine and bisulphite have more recently been suggested as middle and end components for azo dyestuffs.

The condensation of carbazole and ethylcarbazole with *p*-nitroso-phenol yields indophenols, which may be converted by treatment with sodium sulphide and sulphur into the valuable Hydron Blues. The formation of Hydron Yellow—



—by condensing ethylcarbazole with phthalic anhydride indicates another direction in which the carbazole ring-system may be utilised.

Compounds of the **pyrazolone** type—

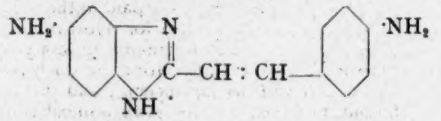


—possess the useful property of being able to couple with diazotised bases to give valuable yellow dyestuffs. It is only necessary to recall that Tartrazine, Fast Light Yellows, Xylene Light Yellows, Eriochrome Red B, etc., are pyrazolone derivatives to make the importance of this group obvious.

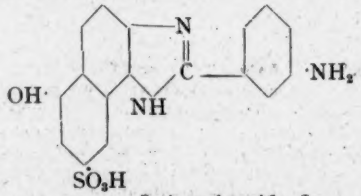
In the anthraquinone series α-hydrazino-compounds are readily converted by dehydration into pyrazolanthrones. Pyrazolanthrone Yellow is derived in this way.

The **indazoles** (benzopyrazoles) are practically unrepresented in dyestuff intermediates, though in the anthraquinone series several compounds of this type have been patented.

The **benziminazole** ring differs from the indole ring in the presence of a nitrogen atom in place of the β-CH. A very interesting type of diamine is the substance,



which, tetrazotised and coupled, gives substantive dyestuffs of deep shade and great affinity (D.R.P. 288190). Cassella's Diamine Fast Scarlets, Azo Scarlets and Azo Orange are disazo compounds derived from naphthiminazoles. These are

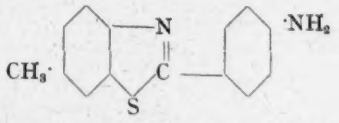


Iminazole acid—J.

obtained by condensing 1-amino-J- or a1-mino-γ-acid with *m*-nitro- or *m*-amino-benzaldehyde; the dihydroiminazole derivative first formed at once loses hydrogen and passes into the iminazole. The dyestuffs are especially fast to acids.

Although a number of anthraquinone compounds containing an iminazole ring have been patented—Truttwin's *Enzyklopädie der Kupenfarbstoffe* (1920) mentions 17 anthriminazoles—none of these figures amongst the vat dyestuffs of known constitution.

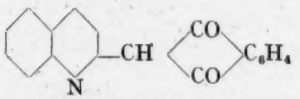
Much more important are the **benzthiazoles.** This group includes the valuable deystuffs derived from dehydrothiotoluidine:



Chlorazol Fast Yellow, produced from dehydrothiotoluidinesulphonic acid by oxidation with NaOCl to the azo compound, is one of the fastest colours known. Clayton Yellow, the corresponding diazo-amino compound, is, on the other hand, very fugitive to light, but is useful as an indicator in the titration of phenols. The well-known Erika colours are made by coupling diazotised dehydrothiotoluidine with nahptholdisulphonic acids; indeed, nearly half the heterocyclic azo dyestuffs of commerce contain the benzthiazole ring. The Thioflavines are methylated products from dehydrothiotoluidine or Primuline.

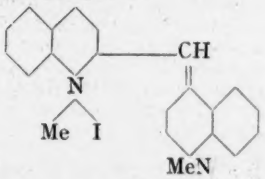
The known thiazoles of the anthraquinone series, made by condensing *o*-aminomercapto-anthraquinones with aldehydes or acids, possess little tinctorial value, but investigations in this direction are far from complete.

We now come to the six-membered hetero-rings. The **quinoline** ring system is found in three types of dyestuff. The first is represented by the long-known and very beautiful Quinoline Yellow and a number of closely related quinophthalones, all made by condensing a quinaldine with phthalic anhydride.

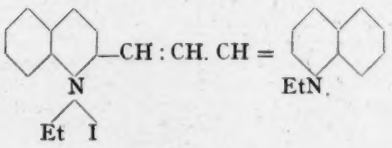


Quinoline Yellow (sulphonated)

The second type includes the photosensitising dyestuffs such as Pinaverdol and Pinacyanol:



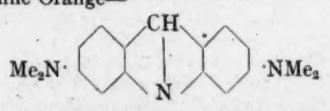
Pinaverdol



Pinacyanol

Finally there are the Alizarin Blues and Greens, obtained by Skraup's reaction from nitro- or amino-alizarin, and Indanthrene Dark Blue BT, made originally by alkaline fusion of benzanthronequinoline.

Fourteen simple **acridines** are commercial dyestuffs, the well-known Acridine Orange—



—being typical. Phosphine, or Chrysaniline, is a valuable acridine by-product of the Magenta process.

In the anthraquinone series acridones such as Indanthrene Violet and acridines like Algol Brown R and Olive R are of considerable importance, and a large number of compounds of this type have been described in the patent literature.

A few **phenanthridines** have been investigated but no products of interest as dyestuffs have so far been discovered.

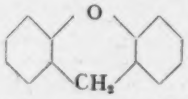
The **azines** form a very large group of colours second only to the sulphur colours in numerical importance. They are fairly easily made by a variety of methods and cover a wide range of shades, though violets and pinks predominate. The group includes such old-established dyestuffs as Indulines, Eurhodines and Safranines, whilst amongst the newer azines are the valuable Wool Fast Blues and Violets. The azo dyestuffs formed by coupling diazotised safranines with β-naphthol, etc., are now superseded by more easily accessible indigo substitutes.

Indanthrene Blue RS is a dihydroazine of the anthraquinone series and is typical of over sixty patented vat dyestuffs, of which about a dozen are recognised commercial colours.

The **thiazines**, though fewer in number than the azines, are almost equally important. Methylene Blue and Brilliant Alizarin Blue belong to this group. There are no known commercial vat dyestuffs of the anthrathiazine type, though nearly a score are described in patents.

Oxazine dyestuffs are much more numerous and include Meldola's Blue, Nile Blues and the large class of Gallocyanines so important to the calico printer. Only three anthroxazines have been patented and the field can scarcely be said to have been exhausted.

The **pyronines** contain no ring-nitrogen, being derived from the anhydride of *o* : *o*¹-dihydroxydiphenylmethane.



Fluorescein, the Eosins, and the valuable Rhodamines belong to this group.

This brief survey is by no means exhaustive, and a glance through the patent literature reveals that practically all the various heterocyclic systems containing one, two or even three hetero-atoms have been used as a basis for dyestuff molecules. The tendency in recent years seems to have been especially to prepare anthraquinone derivatives containing heterocyclic systems, since such products, whether strongly coloured or not, may at any rate be expected to dye cotton more or less readily from the vat. This tendency, if followed in a haphazard manner, is to be regretted. There is no inherent magic in hetero-rings, and indeed only few of them show special chromogenic properties. So far as the anthraquinone series is concerned it is more satisfactory to regard them as convenient chemical mechanisms for fixing certain groupings, and it may be added that the closing of a ring, whether hetero- or homo-cyclic, may usually be expected to intensify colour.

In the case of non-vatting dyestuffs, the field for investigation is very wide. The azines, oxazines, thiazines, pyrazolones and benzthiazoles are certainly well represented, but there remains a large number of ring-systems which have scarcely been considered in relation to dyestuffs. The work of Mills and his collaborators has shown that cyanines may be prepared from several other heterocyclic systems besides that of quinoline, and it is probable that a number of useful diamines analogous to the benziminazole derivative mentioned above await discovery.

Serious Greenock Explosion

THE British Oxygen Co., Ltd., states that the explosion which occurred at Greenock on Thursday afternoon, October 16, was not due to bursting of oxygen cylinders.

No oxygen cylinders of any kind were involved. A cylinder containing dissolved acetylene either dropped off a motor-lorry or fell whilst being unloaded. For some reason, which will, no doubt, be the subject of investigation, the cylinder ripped open and travelled for some yards along the road, during which time the acetylene was rapidly being discharged from it. Through some cause not yet ascertained the mixture of acetylene and air which thus took place was ignited, and a violent explosion resulted, which appeared to have done all the damage. Fourteen victims of the explosion are still detained in the local infirmary. Altogether fifty dwelling-houses were damaged as well as a number of shops.

British Dyestuffs Industry, 1914-24

By W. J. U. Woolcock, C.B.E.

(*Chairman of the Dyestuffs Development Committee.*)

PERHAPS the most striking fact that emerges from a review of the British dyestuffs industry during the past decade is the almost complete reversal of the relationship between the quantities of British and of foreign colours in consumption in the domestic dye-using industries immediately prior to the war and at the present time. Thus it is estimated that whereas Great Britain's half-dozen factories contributed in 1914 barely 20 per cent. of the total consumption, to-day her score of factories supply well over 80 per cent. Pre-war her dyes were largely dependent upon foreign supplies of intermediates. At the present time she is practically self-supporting in this respect.

During the war, when foreign supplies both of intermediates and of dyestuffs were virtually cut off, the efforts of our dye-makers enabled textile and other consumers to keep their factories running, even though they could not obtain the full range of dyewares and not always the high quality to which they had previously had access abroad. The Sankey Judgment threatened the reviving industry with extinction when it opened the flood gates once more to competitive foreign dyes. Then the passing of the Dyestuffs Act ensured a measure of security, which enabled us again to go forward, and under its limited protection the past few years have seen splendid development in range, quality, standardisation, and output of products. The body of responsible users agree that the present quality is, in general, excellent. No more valuable testimony can be desired, but if further proof be needed it is to be found in the attitude of the German Interessen Gemeinschaft towards the dyestuffs industry of this country to-day. It can be said that the essential colours are well represented in the British range, which is being constantly extended in conformity with the requirements of the using interests. This applies to all classes and types of dyes from the commonest to the highest class.

Trade Depression

The past year or two has witnessed a general trade depression which has seriously hampered the dyestuffs industry. Falling off in demand has resulted in plants being worked at much below their full capacity in many cases and this circumstance has reflected adversely upon the economy of the processes. Hence, although the general level of prices has been, and is, continually falling, the rate has not been so rapid as would have been the case under normal conditions of trade. Comparison of British prices with the German prices of corresponding products, on the other hand, is liable to give rise to unsound conclusions, and it should be borne in mind that much of the advantage appearing on the side of the German may be, and probably is, attributable to factors quite outside normal industrial economy.

It is evident that much attention is being paid to the relationship between the present world-capacity for dyestuff production and the world-consumption, in Germany no less than in Great Britain. Without doubt competition in the markets of the world is keen, and will become keener, and it may be assumed that the nation whose dye industry is most soundly organised will ultimately hold the field. Co-ordination of effort and prevention of overlapping; development of by-products; extensive research; sympathetic alcohol regulations, etc., are amongst the important factors to be observed if our dyestuffs industry is to attain the eminence for which it has put up so brave a fight.

Chemical Agents' Court Case

AT Lambeth County Court on Monday, October 20, John G. Gillam, trading as Graham, Gillam and Co., chemical agents, of 3, Iddesleigh House, Caxton Street, Westminster, brought an action against Baxter and Co., cartage contractors, of Greenhundred Road, Old Kent Road, London, claiming £27 14s. damages for the wrongful warehousing of a certain store of B.P. Epsom Salts. Evidence showed that the salts depreciated through damage due to damp storage, but defendants had accepted no responsibility and had no proper warehouse. Judge Parry gave judgment for defendants with costs.

What British Dyestuff Firms Are Doing.

Progress During and Since the War

The following notes kindly contributed by British dyestuff firms in reply to inquiries indicate some of the developments which have taken place during and since the war.

L. B. Holliday & Co., Ltd.

INDIVIDUAL enterprise has always been the characteristic British method, in business as in everything else, and it is the mainspring of the whole mechanism of our manufacture and commerce. It is fortunate, therefore, that the various measures to solve the dye problem, involving public assistance, still left the field open to such private enterprise as would make the venture.

There were those who held, indeed, that if the problem were considered as the building up and carrying on of the business of manufacturing dyes on a practical and economically sound basis, this could only be attained by individual enterprise, and in no other way successfully; and that in this country, where the dye industry had its rise and fall and where all the necessary raw materials are to be had in abundance, it should be possible for such an industry to be sound and self-supporting from the beginning; and that, other things being equal, dyestuffs should be more cheaply manufactured in Great Britain than in any other country in the world.

Unassisted Enterprise

It is this point of view for which the firm L. B. Holliday and Co., Ltd., of Huddersfield, stands to-day in the dyestuff industry. Arising out of the old and honorably known firm of Read, Holliday and Sons, Ltd., it has not only perpetuated the name and local tradition of that firm, but has established new works on a fresh site of sixty acres, affording employment, when in full swing, for about a thousand work-people. It has manufactured every type of dyestuffs, including some of the most complex and the most urgently wanted; and by so doing has achieved a reputation for the quality and consistency of its output which is second to none in this country. It has, moreover, done this without any subsidy or loan out of the public purse. On its own resources it has survived the slump and the Sankey judgment; it has written down its war-time capital expenditure to an economic level and now faces the future with confidence.

The success attained is all the more striking in view of the fact that the firm made a late start (the first sod was not cut until September, 1915) and, moreover, in contrast with other firms which succeeded in some measure in meeting the dye shortage, started from zero, having no plant, no staff, no process in work and no business connections established. It is quite true that the fresh start carried with it some advantage also. There was no temptation, for instance, to be satisfied with tinkering with old and inadequate staff, plant, buildings, or site, but all these could be chosen with care and planned on a scale commensurate with the new needs; so that, to take one point only, the new works at Deighton are admirably situated with regard to canal frontage and railway facilities.

Ideal of Service

Messrs. L. B. Holliday and Co., Ltd., now manufacture over 550 dyestuffs, together with most of the corresponding intermediates. Nevertheless, they are far from regarding the achievement as finished, or as anything more than a good beginning. Nor is the firm content to rest satisfied with the manufacture of a range of dyestuffs, however pure and however fast they may be. They desire to provide the consumer of dyes with accurate information concerning them, and to put the resources of their laboratories and dye-houses at his disposal for the elucidation of difficulties, believing that dyestuff manufacture means the providing of a service in addition to a commodity.

The manufacture of dyes in this country, having been taken up on this comprehensive scale with the initial approval and encouragement of dye consumers generally, must, of course, in order to come to full fruition, receive the continued support and co-operation of the consumer, and Messrs. L. B. Holliday and Co., Ltd., are prominent among those enterprising British firms who, by means of research and manufacturing skill, are so conspicuously meriting that support.

Any statement that dyes manufactured in Great Britain are less fast than dyes manufactured elsewhere is to-day an absolute fallacy. L. B. Holliday and Co. beg to draw attention to their exhibit in the Chemical Section of the British Empire Exhibition which consists of a number of ocular demonstrations of this fact. Each of the eight sections of the octagonal showcase contains pieces of mohair plush dyed to one of the seven colours of the solar spectrum, or to black or grey, with dyes produced at the Huddersfield works of Messrs. Holliday. Together with these patterns are a series of comparative exposure cards showing the results of official and impartial exposure carried out by the Huddersfield Chamber of Commerce, against dyeings of authentic samples of the fastest foreign dyes.

We would particularly direct attention to these results which speak for themselves and are in no single case to the disadvantage of the British product; and we would also emphasise the fact that only on such careful and accurate comparison can any exact and authoritative estimation of fastness be based.

Hickson and Partners, Ltd.

Raymond Vidal! What a revolution in cost on dyeing this young French professor made when he discovered the first Sulphur Black in 1893. Subsequent to the introduction of the boiling process for a Dinitrophenol Black in 1899, little alteration was made in its manufacture until after the war. Many dyers contended that the blacks produced thus did not give as fine a black as the original para-amino-phenol black of Vidal, though the economy of the boiling process ousted the older black.

In 1919 Mons. Vidal produced a new range of blacks, showing a marked economy over the pre-war Sulphur Blacks and possessing a beauty of tone never before attained. Owing to his earlier connection with Mons. Vidal, Mr. Ernest Hickson was able to secure this process for his company. After some initial difficulties with plant, the new products were offered to the trade under the name of Vidal Victory Blacks, after their discoverer and in commemoration of the Allied victory in 1918. A full range of types is made. These blacks possess properties somewhat different from those of an ordinary Sulphur Black. Dyers are appreciating these more and more, as is shown by the fact that although the plant was doubled early this year the whole unit is now on full output. Other types of Sulphur Black are also made at Castleford. As they make all their own intermediates, Messrs. Hickson and Partners are in a unique position in this country, having their raw materials for black-making at cost price in their own works.

Large units are also in operation at Castleford producing a wide range of intermediates for dye making, dinitro-chlorbenzene made on the old war-time T.N.T. plant, para-nitrotoluene and para-toluidine being among the more important of these.

The "New Magenta process" was never developed in England pre-war to any serious extent. Realising the advantages of this process, Hickson and Partners have made it a special feature in their programme. Adopting the original British name of Roseine, they offer this as a powder under the name of New Roseine O, which is of particular interest to paper makers and calico printers. Roseine crystals are also made, primarily for the Indian market, although they are used in this country largely for the manufacture of Soluble Blues.

The technical side of this concern has been greatly strengthened since Mr. G. H. Frank, M.Sc., F.I.C., joined the staff as works manager earlier in the year. Since the internal reorganisation at that time, marked economies both in chemical efficiency and engineering expenses have been effected, which have enabled the firm to offer good price reductions to their customers.

North British Chemical Co., Ltd.

Replying to your letter dated October 3, we have pleasure in stating that with the cessation of hostilities, and a consequent free supply of indispensable raw material, we at once turned out attention in the direction of improving and extending the range of English-made dyestuffs, in order to decrease the dependence of home consumers of foreign produced colours.

In this connection no time was lost in introducing an improved quality of sulphocyanine, originally manufactured by the Bayer Co., and used very largely in the woollen industry for navy blues, either as self shades or in conjunction with indigo. The resulting Sulphone Navy Blue 5RX Conc. thus marketed has been admitted to be equal in every respect to the previously imported German dyestuff. The same remarks may be applied to our Sulphone Acid Black B, which has also enjoyed an increasing popularity.

These were followed by our Hexamine Brown YRP, replacing in its turn Oxydiamine Brown 3GN—an important direct cotton colour, whilst in rapid succession the undermentioned additional dyestuffs were credited to our range, none of which had been previously manufactured in Great Britain :—

Hexachrome Brown RH. Extra	(Acid Anthracene Brown RH. Extra)
Hexachrome Yellow C.	(Anthracene Yellow C.)
Acid Deep Blue G.	(Wood Black 10B.)
Acid Levelling Red 2B.	(Brilliant Lanafuchsine 2B.)
Acid Levelling Red 6B.	(Brilliant Lanafuchsine 6B.)
Hexamineral Black Blue B.	(Benzochrome Black Blue B.)
Hexamine Azurine 5G.	(Brilliant Azurine 5G.)

The pre-war foreign prototypes are in parentheses.

Our researches are still being continued, and in the near future we hope further to augment our series of home produced dyestuffs to the exclusion of formerly imported equivalents.

J. C. Bottomley and Emerson, Ltd.

J. C. Bottomley and Emerson, Ltd., Brighouse, Yorks, have been established as chemical manufacturers since 1851, but the actual manufacture of aniline dyes was not commenced until 1917. Their works being controlled during the war under the Munitions of War Act, the production in bulk was not possible until after the Armistice. Progress was then speedily made, and at the present time the firm are regularly manufacturing acid colours, direct cotton colours, and a few chrome colours. It has not been the policy of the company to produce a large variety of dyestuffs, but rather to concentrate on a comparatively small number and to produce these in quantity under the most economical conditions.

One of the colours which the firm is regularly manufacturing, and which was never made outside Switzerland and Germany before the war, is their well-known Tartrine Yellow O ; the pre-war continental name of which was tartrazine. Before Tartrine Yellow O could be produced, it was necessary to make the required intermediates, and this was successfully accomplished. The dyestuff was produced in 1921, and is equal in every respect to the original continental standard, and is made in all pre-war strengths.

The dyestuffs mainly manufactured belong to the Azo and Stilbene classes, but tri-phenyl-methane dyes are also made.

The principal specialities are Naphthazine acid colours for wool, Diazine Direct colours for cotton, and Alphachroic chrome colours, but dyestuffs for leather, paper, jute, etc., are also made.

A well-equipped laboratory is maintained under efficient control, and progress has been steadily made in the manufacture of new products and the perfection of existing processes. The firm also manufacture nitric acid, nitrate of iron, sulphate of soda, metachrome mordant, and dyers' chemicals generally.

J. C. Oxley

The firm of J. C. Oxley's Dyes and Chemicals, Ltd., of Dewsbury, was founded in 1916 for the manufacture of certain products necessary for the successful prosecution of the war, making in the first instance pure benzol, toluol and naphthalene, and until the end of the war-period dyes for khaki. With the cessation of hostilities and release from the stringent and cramping conditions that war imposes they were free to launch out along individual lines of research.

Having started with the manufacture of the Lighthouse chrome yellows, which are now well known in the trade, they have since extended their range of chrome mordanting colours to include oranges, reds, and browns, all possessing good fastness properties, and have meantime specialised in acid wool dyes possessing good fastness to light and easily levelling properties suitable for the Bradford dress goods trade. One of this series was Brilliant Acid Rosamine 2G. The manufacture of this colour is a striking example of the value of the Dyestuffs Regulation Act, for it has had far reaching effects not only in reducing the price of the commodity to one quarter of its then market rate as supplied from the Continent, but has also compelled the foreigner to have this particular dye made in this country by British labour.

The firm has also installed an elaborate dye laboratory for testing and matching samples and for standardising products, and a well-equipped research laboratory fitted out on the most approved lines and competently staffed.

Williams Brothers and Co.

The firm of Williams Brothers and Co. manufacture dyes more particularly for the small user. A special point is made of being able to match any dye and supply it in small as well as large lots. Nigrosine, which is the firm's principal speciality, is made in large amounts, and supplied as the base, or in water and fat soluble forms. The entire business has much increased since the war. The works have been almost wholly rebuilt, and now cover nearly five times the area they did in 1914. The size of the nigrosine plant has been increased by 50 per cent., but owing to improvements in the process the output has been more than doubled. An increased range of azo colours is being made, and a large portion of the works extensions is devoted to producing these. About four times as many men are employed as in 1914, as the increased business has entailed a new boiler house, machine shop, storage rooms, larger laboratory, etc. The plant is now modern throughout and further extensions are contemplated. It must be emphasised, however, that this development is entirely due to the protection from the Dyestuffs Act, and a further continuance of this is essential to the maintenance of the present output. It may also be mentioned that several proposed extensions were temporarily held back this year because of the proposed Anglo-German agreement, which would have probably had a very unsatisfactory reaction on the firm's business if it had been carried out in the suggested form.

John W. Leitch and Co.

The firm of John W. Leitch and Co. (now John W. Leitch and Co., Ltd.) was established in the year 1890 for the manufacture of coal tar derivatives which were used in the aniline dyes and explosives trades. Many of the large aniline dye makers of Germany and Switzerland were supplied in pre-war days with intermediate products for aniline dyes, but since the middle of 1917 the firm has extended its operations into the actual manufacture of aniline dyes, and as it has maintained, and in some cases surpassed, the high quality of the intermediates which in pre-war days were bought by the Continental makers, the resulting aniline dyes have reached a very high standard of excellence. The firm is now manufacturing a fine range of acid, basic and direct cotton colours, comprising many which were not produced in this country before the war.

A notable achievement has been the introduction during the last three years of a series of pigment colours of great fastness to light, lime, heat and water. Up to the present these include Yellows, Oranges, Reds and Scarlets, to replace the Hansa, Lithol and Helio types of colour, for making paints, distempers, printing inks, coloured papers, etc.

The firm has also recently extended the manufacture of fast bases for ice colours, which now include the following :—

Fast Yellow Base G.L.	Fast Red Base R.L.
,, Orange ,, G.L.	,, ,, ,, G.L.
,, Scarlet ,, G.L.	,, Corinth Base B.L.
,, ,, ,, G.L. Special	,, Garnet ,, L.
,, ,, ,, 2 G.L.	,, Garnet ,, C.L.
,, ,, ,, G.C.L.	

These are to replace the German bases of similar names, and are becoming very popular.

The excellent range of oil soluble colours manufactured by this company is also an important contribution towards making this country independent of foreign supplies.

Ajax Aniline Dye Manufacturing Co., Ltd.

With reference to your letter of October 3, we have pleasure in giving you particulars as to the progress which is being made at our works. Our company was formed in 1919, and commenced manufacturing sulphur black and sulphur colours, and a number of acid colours were manufactured in quick succession, including Acid Orange, Orange GG, Acid Scarlet, Acid Crimsons, Acid Reds, including easily levelling Fast Reds, Tartaric Acid Yellow, and other Acid Yellows; various Acid Browns, specially manufactured for the leather trade, Bismarck Brown, Chrysoidine, Methylene Blue, Direct Cotton and Union Blacks, Direct Cotton Browns, Red, Green, Blue, etc. A full range of spirit and oil soluble blacks and colours are also turned out, as well as a number of intermediates, such as H. Acid, G. and R. Salt, etc. These ranges are being steadily added to.

Gas Light and Coke Co.

We are not actually makers of dyes, but are large producers of one of the most important intermediates used in their manufacture—viz., beta naphthol.

Before the war this intermediate was not made in this country, but in the meantime our company has taken up the manufacture and has erected up-to-date plant on such a scale that to-day we are in a position to supply the whole of the country's requirements in this article and, in addition, to manufacture for export as soon as the condition of the foreign exchanges makes it possible for us to obtain a share of the business in other countries.

Our beta naphthol is of first-class quality and fully equal to any produced in Germany.

Action of Caustic Soda on Cotton

THE Manchester Section of the Society of Dyers and Colourists held their first meeting for the Session 1924–25 on Friday, October 17, in the Lecture Room of the Manchester Literary and Philosophical Society.

Mr. J. Huebner, the chairman of the Manchester Section of the Society of Dyers and Colourists, gave his inaugural address entitled "The Action of Caustic Soda on Cotton," in which he described the results of an investigation carried out in collaboration with Mr. E. Wootton. He referred to some interesting changes which occur in cotton yarns and cotton fabrics when treated with caustic soda solutions of a wide range of concentrations reaching both well below and above the strengths usually employed in mercerising.

The authors found that whilst bleaching, as is well known, invariably reduced the ripping strain of fabrics, mercerisation increased it considerably, the weft being less affected than the warp. It was also ascertained that the absorption of iodine by cotton was considerably affected by mercerisation and that the iodine absorption curve corresponded closely to the absorption curve for the direct dyeing dyestuffs, as well as to the shrinkage curve.

With one exception it was found that the amount of moisture present in cotton after mercerisation increased with the concentration of the caustic soda used.

The authors further showed that when the total moisture present in cotton after mercerisation with different concentrations of caustic soda is driven off by heating, and when the dried cotton is then exposed to the atmosphere, in order to regain the moisture, the regain of the mercerised is considerably less than that of the untreated cotton. A comparison with the moisture curve with the regain curve shows that wherever the hygroscopic moisture curve rises the regain curve falls and *vice versa*.

It is also of interest to note that the different changes in the characteristics of the cotton fibre, due to treatment with caustic soda lye, are most marked when soda of between 20° and 30° Tw. is employed.

Safety in Chemical Works

SEVERAL recent accidents in chemical works accentuate the desirability of strict discipline and supervision in the matter of accident prevention. The use of safety belts or rigs at noxious air work is often disliked by the workers, but statistics prove that only the strict enforcement of safety precautions will keep accident figures down. The provision of safety rig and appliances is essential, and the inculcation of the moral obligation to use them rests with employers.

"The Spirit of Science"

Address by Professor Henry Armstrong

PROFESSOR H. E. ARMSTRONG, F.R.S., spoke on "The Spirit of Science" at the inaugural lecture of the Chemistry Section of the Leicester Literary and Philosophical Society, on Wednesday, October 15. An audience of some 300 was present, and Mr. C. J. Bond, F.R.S., was in the chair.

Indulgence, even deep indulgence, said Professor Armstrong, in a scientific occupation, even the possession of great scientific ability in some particular field, does not necessarily make a man scientifically sane all over. Apparently, our brains are compartmented and the compartments are not necessarily interlocked. We are creatures of evolution, and under the severe conditions of nature only those have survived who could think together, work together, and wonder together. Just as a man has selected certain tools suited to his daily use so we have been selected as types, fitted to the society in which we have lived. To-day, freedom of thought is beginning to be allowed, and every kind of freak is having his chance—the scientific worker among them. The scientific freak has proved himself capable of anything—he is fast undermining the foundations of society and has made the whole world kin. His doings and his power must be understood if we are to reconstitute society upon a stable basis.

The human mind has a trick of tying itself into knots, and prefers to follow fashion rather than reason. It is a strange mechanism, and like the mechanisms we ourselves construct varies greatly both in kind and in perfection; and the position is aptly summed up by the most distinguished French literary man of the day in saying: "I know there is no certainty outside science, but I know also that the worth of scientific truth lies in the methods of its discovery and that those methods are not to be arrived at by the common run of mankind."

Surely our duty is to learn all we can of the method which underlies modern progress and modern practice—to do what we can to overcome the imperfections of our understanding. I believe it to be no longer merely a question of inviting people generally to become interested in science and take up the study of scientific method. No, it is a matter of immediate urgency—not only our material safety but our peace of mind and our whole mental outlook are at stake. The prime mission of science being the search after truth, science and pure religion—religion divested of dogma—cannot be in conflict. The Church of the future should be the first to advocate and use scientific method in the service of morality and ethics of conduct. Science has a great social constructive work before it, to demonstrate and develop the power of human understanding and our ability to trust in ourselves. The primary need of the day is the abandonment of jargon—that cleric and sciencer alike should talk in terms that can be understood of the masses.

The spirit of science is the art of calculated, reverent inquiry into all things—which we call scientific method. At present, we do but educate the worser part. Adapting a writer of the day—education may make us ignorant, but we are born inquisitive. There is no imagination, no real purpose in our system. Surely it is for us to take arms against our sea of troubles by turning our thoughts earthwards and seeking to enjoy and to know what is ours, to have and to hold till death do us part, recognising that there is infinite beauty spread out for our enjoyment—satisfied to believe that we are but the present links in an ever moving chain and that it is our prime duty to make each link fulfil its due purpose.

Anglo-Russian Trade

MR. A. G. MARSHALL, managing director of Becos Traders, Ltd., is giving a lecture at 5 p.m. next Monday, at the Samson Clark Building, Mortimer Street, London, W.1, on "Present Conditions governing Trade with Russia." The chair will be taken by Mr. Martin Cox, a director of Messrs. Mather and Platt, Ltd. Mr. Marshall has recently returned from another long visit to Russia, and his address will therefore be of particular interest to manufacturers and merchants now seeking an outlet in that market. He will treat his subject entirely from a trading point of view without entering into any political controversies. Admission to this lecture will be by ticket only, which may be obtained on application to Messrs. Samson Clark and Co., Ltd., 57/61, Mortimer Street, W.1

Catalysts in Carbonisation

Paper by Dr. Lessing before the Chemical Society

At a meeting of the Chemical Society on Thursday, October 16, a paper on "The Influence of Catalysts on Carbonisation" was read by Dr. R. Lessing and Mr. M. A. L. Banks. Work on this subject was done by Dr. Lessing in 1914, but had to be abandoned on account of the war, but the investigations have since been resumed with the object of ascertaining the effect of individual compounds on the carbonisation of coal. Recent investigations by Dr. Lessing showed considerable differences in the composition of the mineral constituents of the four main ingredients of bituminous coal, differences which have since been found typical for each coal constituent. One of the objects of the present work has been to trace the influence of the typical ash on the behaviour on carbonisation of fusain, durain, clarain and vitrain. As the ash in coal cannot be reduced below a certain minimum, sugar and cellulose, practically free from ash, were investigated in the first instance. Forty catalysts were tried, the compounds being added at the rate of 0·01 gram molecule per 100 grams of sugar or cellulose, either in solution or dry, and the coke yield was found to vary between 18·74 per cent. and 5·02 per cent. in the case of sugar, and between 20·36 per cent. and 5·10 per cent. in the case of cellulose. These results were obtained on carbonising the material by the platinum crucible method for the determination of volatile matter in coal (for three minutes only). The authors found that any compound which acted at all did so in the direction of an increase in the coke yield. Whether the action was a truly catalytic one, however, could not be decided on the evidence so far obtained, and definite proof seems difficult since the great majority of the chemical reactions involved in carbonisation are irreversible.

Experiments are in hand, but are not yet concluded, to find whether the directional action of the catalysts consists mainly in the formation of intermediate products yielding different percentages of coke during subsequent stages of carbonisation, or whether the influence of the catalysts extends to the reactions taking place at these later high temperature stages of carbonisation. The remarkable quantitative variation in the yield of coke is equalled if not surpassed by the differences in appearance and structure shown. At the same time, the change which the various compounds undergo during the heating process makes it uncertain whether the original salt, base or acid or their intermediate or final products of decomposition are the actual catalysts.

Experiments with Prepared Coal

A few preliminary experiments were made with coal, although the disadvantage of its inherent ash was realised. Dalton Main (S. Yorks) coking coal was used. After grinding to pass through a 10-mesh sieve, the fusain and some fine dust were removed by elutriation. The remainder, after screening into portions larger and smaller than 30-mesh, were subjected to float and sink tests, and the original ash percentage of 1·11 per cent. was reduced to 0·86 per cent., this consisting principally of clay and shale. The impregnation of the coal was done with solutions of the same concentration and in the same proportion as in the case of sugar and cellulose. Carbonisation was carried out only by the dry method. There was no difficulty in carbonising this coal in the electric furnace, and the yields of coke, tar and gas were determined. Similar variations in the results were found as in the case of sugar and cellulose, it being found that the coke yield decreased as the formation of retort carbon increased whilst the tar roughly increased as the coke decreased, but the percentage variation was considerably greater than that of the coke. It was seen from the results, moreover, that the rate of gas making remained unaffected by the addition of the various catalysts, as did the final yield of gas.

The number of catalysts tried so far was smaller than that used in the sugar and cellulose experiments. They arrange themselves, however, in practically the same order, with the untreated coal at the bottom of the list. It was somewhat surprising that the external appearance and size of the coke cylinders obtained did not vary to any extent, but there were indications that their internal structure, and consequently the density, porosity and reactivity differed considerably, as, indeed, was implied by the combination of varying weight and constant volume. Emphasis was laid upon the fact that the coal examined consisted only of clarain and vitrain, and, as had previously been pointed out in another communication on the subject, the formation and susceptibility to "cracking" of the primary liquid products from clarain, vitrain and durain respectively, indicated a considerable difference in their chemical nature. The results obtained, therefore, the authors observe, must not be applied without discrimination to other coal constituents, and still less to coals of different type or origin. It is suggested, however, that the results are sufficiently definite to indicate that a great deal, if not the bulk, of the research work which has been done on the carboniastion of coal and other fuels is subject to considerable revision, as in most of this work the influence of the composition of the mineral matter, apart from the amount, on the course of the carbonisation of the coal was entirely neglected.

Thanks were expressed to the Fuel Research Board for enabling Mr. Banks to devote time to this research.

Reconstruction of Magadi Soda Co.

Creditors Approve New Scheme

A meeting of the creditors was held on October 17 at the Connaught Rooms, Great Queen Street, Kingsway, London, for the purpose of considering a scheme for the settlement of the company's liabilities. The scheme, which embodied proposals by Brunner, Mond & Co., Ltd., provided for the winding-up of the Magadi Soda Co., Ltd., and the registration of a new company of the same name, with a share capital of £830,000, divided as follows: 250,000 (6 per cent.) first preference shares of £1 each; 1,320,000 (6 per cent.) second preference shares of 5s. each; 600,000 (12½ per cent.) preferred ordinary shares of 5s. each; and 100,000 ordinary shares of £1 each. The new company would create and issue £500,000 first mortgage debentures, which would be redeemable at £105 per cent. The Articles of Association of the new company, together with the debentures, were to be in a form to be approved by the Official Receiver and Brunner, Mond & Co., Ltd. Of the first directors of the company, one was to be nominated by the Governor of Kenya Colony, another by the trustee for the first debenture holders, and the remainder by Brunner, Mond & Co., Ltd. The names of those first directors had also to be submitted to the Colonial Office, and to the Official Receiver for approval. The new company would take over the assets of the old concern. The first debenture holders in the old company would receive an equivalent number of debentures in the new company, while the existing second debenture holders and each unsecured creditor and claimant would be allotted first preference shares in the new company equal in nominal value to 75 per cent. of their claims against the old concern. Preferential claims to the extent of £22,000 would be paid in full, and provision was also made for the ordinary shareholders of the old concern. It was further provided in the scheme that Brunner, Mond & Co., Ltd., should subscribe for the 100,000 ordinary shares at par in the new company, in cash, and also for certain of the preferred ordinary shares. Brunner, Mond & Co., Ltd., would give guarantees to the satisfaction of the Colonial Government and the Official Receiver that they would work the Magadi Soda Co.'s property to its full economic capacity. The scheme was subject to a lease being granted by the Colonial Office to the new company.

Mr. H. E. Burgess, the senior Official Receiver, said the claim by the Clearing Office was about £10,000, which would be paid in full under the scheme. The remainder of the creditors, other than those whose claims were preferential, would receive some charge to the extent of three-fourths of their claim. Prior to his coming on the scene there had been various negotiations for the reconstruction of the company.

The Proposed Scheme

Two schemes were propounded, one under the influence of a firm of stockbrokers, while the second was to give the future management of the concern more or less into the hands of Brunner, Mond & Co., Ltd. The schemes in their original form could not be carried through, and the Colonial Office did not see fit to accept them. Certain modifications were made and it was eventually agreed that if Brunner Mond's scheme went through a new lease would be granted under

certain conditions. He had always encouraged the Brunner Mond scheme provided it gave something to the creditors and shareholders. The present scheme was the result of very lengthy negotiations, and it had been necessary to overcome the scruples of the Colonial Office. The unsecured creditors of the old company were being treated on the same footing as the existing second debenture holders. The Chairman added that if the scheme did not go through the position of the creditors would be a very hazardous one. Some of the debenture holders thought that if the scheme was not agreed to they could realise sufficient assets to discharge their own claims. He thought that argument was fallacious, and that the security was very doubtful. The debenture holders could not make any demand on the Colonial Office for the granting of a new lease. The Colonial Office were particularly anxious to see that the undertaking got into safe hands. If a realisation took place, apart from the lease, there would probably not be more than a quarter of a million sterling. It was essential that the scheme should go through with the live assistance of Brunner, Mond & Co. behind it.

The creditors passed a resolution unanimously expressing approval of the scheme, and it was stated that the result of the voting would be reported to the Court.

Life and Work of Dr. Ludwig Mond

First Lecture by Professor H. B. Dixon

THE inaugural lecture under a scheme established in accordance with the provisions of the will of the late Mrs. Mond, in memory of her husband the late Dr. Ludwig Mond, was delivered on Monday evening by Professor H. B. Dixon, F.R.S., at the Manchester University. The scheme provides for the giving, on alternate years, of lectures on pure science, applied science, and some other subjects.

The Vice-Chancellor of the University (Sir Henry Miers) in calling upon Professor Dixon to deliver his lecture, said that, owing to the beneficence of the late Mrs. Mond, they were enabled to bring distinguished scientists to lecture not only to the students at the University but also to the public at large. The late Dr. Ludwig Mond was representative of both pure and applied chemistry, and he was pleased to find they were honoured by the presence of Dr. Robert Mond, the eldest son of a most distinguished father.

Professor Dixon, in delivering his lecture entitled "Life and Work of Dr. Ludwig Mond," referred to the address given by Dr. Mond at the opening of the first laboratory in Great Britain designed for the special study of organic chemistry—the laboratory built in that college as a memorial to Professor Schorlemmer. Dr. Mond said: "Our progress is measured by the increase of our knowledge, which alone enhances our power over the forces of nature and enables us to turn them to the uses of man. Any advance in pure science is very soon followed by advances in our industries. The immense development in the practical application of electricity, for instance, which we have witnessed of recent years, we owe far more to Faraday's scientific work than to all the numberless inventors who have followed up his various discoveries and turned them to practical use." Those words were spoken in that very room nearly thirty years ago by the greatest technologist of the time. The life of Dr. Ludwig Mond was modelled on this belief, his industries were founded and built on scientific study, and by his generosity he repaid what he felt to be his debt to science by creating and aiding opportunities for scientific research. In Manchester they were grateful to him for the assistance he gave in the study of organic chemistry and of electro-chemistry. In the fulness of time there came also the splendid gift to the nation of the "Davy-Faraday" laboratory.

Professor Dixon then dealt with the educational period of Dr. Mond at Cassel, Marburg, and Heidelberg, his friendship with Bunsen and Solvay, and his connection with the improvement of the Le Blanc process for the manufacture of artificial soda. The early struggles of the late Sir John Brunner and Dr. Mond in the successful foundation of the great works at Winnington were fully described. An estate of 130 acres was purchased from Lord Stanley. In 1874 they produced their first soda. Some conception of their initial difficulties with their plant could be gleaned from Sir John Brunner's words when he said "Everything that could break down did break down, and everything that could burst did burst." For some time Mond slept on a platform over the engine. He was constantly strengthening and improving the apparatus, while a no less arduous labour was that of training the workmen. Following the success of the Winnington undertaking the most inventive years of his life began. He stablised the ammonia process, designed the Mond Gas Plant for providing smokeless fuel and power, and dealt with the loss of chlorine in the Solvay process, and did much other noteworthy work. The lecturer then referred to the invaluable services rendered by the firm to the nation during the war period, than which there could be no greater monument to the genius of the late Dr. Mond. As an employer, he was known to be just, considerate and generous to his workmen.

Professor Dixon also dealt with that period of Dr. Mond's life which was passed in Rome, and further stated that the Doctor never sought honours, but gratefully accepted the distinctions offered him by universities and scientific societies. He acted as Foreign Secretary to the Society of Chemical Industry from its foundation until he became its President; was President of Section B of the British Association, and joined the Philosophical Society in 1881, but was unable to accept its invitation to become its President. Again, he was long a fellow of the Chemical Society, but declined to allow himself to be nominated as President upon the ground of ill-health. In 1891 he was elected a Fellow of the Royal Society and served upon its Council, while at the International Congress of Applied Chemistry held in London in the summer of 1891 he was host to the foreign chemists attending the Conference. This was the last public function he attended. His fine constitution yielded to the insistent calls he made on its strength—the mind tired out the body. In the autumn he began to sink, and he passed away at the age of 71.

A vote of thanks to Professor Dixon for the lecture was moved by Dr. Robert Mond.

Works Strike at Laporte's

Statements by Employers and Employees

THE strike of 200 odd employees, chiefly process workers, of B. Laporte, Ltd., chemical manufacturers, Kingsway, Luton, for increased wages and recognition of their Union, the National Drug and Chemical Union, which re-opened on October 6, has taken a more serious turn.

During last week Mr. H. E. Alcock, managing director of the firm, returned from Bournemouth, and on Thursday, October 16, a statement was published by him in which the following occurred:—

"1. 90 per cent. of our process workers are engaged in work which is not carried on by any other British firm, and, consequently, no comparison can be made with the rates of pay in any other British factory.

"2. Our chief competitors are German manufacturers, whose rates of pay are little more than one half of our present scale.

"3. The products made by the poorly paid labour in Germany are freely sold in this country in competition with our goods. It is only by our modern plant and high state of efficiency that we have been able to compete successfully with our competitors.

"The carefully considered and unanimous decision of the Board is: 'When the National Drug and Chemical Union is in a position to improve rates of pay in our competitors' works to a standard equivalent to our own we shall be in a position to consider applications for increased rates of pay. In the meantime we cannot agree to any interference with the management of our business.' The action taken by our men in coming out on strike, without notice, contrary to the advice of their executive, has already affected the possibility of our selling our products in certain markets. The result of this will be that, much to our regret, for some time to come we shall not be able to find employment to the same extent as we did before the strike. . . . Sooner or later some of the men employed by us will realise that they have been misled, and when they are prepared to resume work at the wages paid by us we shall arrange to recommence the manufacture of some of our products."

Since the publication of this statement the men's Union has issued a printed pamphlet setting forth the whole of the negotiations between the firm and the Union since August,

excluding the above statement. This pamphlet has been sent to every shareholder. Among statements in the pamphlet is :—

"1. Wages paid by your firm range from 8½d. to 10½d. per hour, which produces for seven working days, 56 working hours, £1 10s. 8d. to £2 0s., both less insurance deductions of 1s. 3d."

The Firm's Reply

Concerning clause (1) "wages," the firm issued a further statement on Saturday, October 18, declaring that this statement was not true. "The following is the firm's paysheet for the week ending October 1, which is a representative week :—197 men received an average of £2 10s. 3d. ; 16 men (the lowest paid) received £2 5s. 0d. ; 30 men (the highest paid) received £4. The above includes the whole of our unskilled labour, with the exception of 10 boys and four elderly men, the latter receiving 10d. per hour. As far as we know, excluding municipal and public service employees, there is not a firm within a radius of 10 miles of Luton and employing at least 100 skilled men which can show an average equal to ours. The well-being of our men is one of our chief considerations, and it would be foolish if, by taking short views, we yielded to demands which are impracticable, and interference which would be intolerable. So soon as the position warrants we shall increase the rates of pay voluntarily, as we have done in the past, without pressure from any outside organisation."

The Union secretary has suggested that a conference be arranged at an early date to settle all differences.

The Priestley Lecture

Pioneer Work on Common Gases

THE second annual Priestley lecture organised by the Birmingham and Midland Institute scientific society was delivered on October 15 by Professor G. T. Morgan.

Professor Morgan referred to the early activities of Joseph Priestley in Birmingham, which terminated in a riot and in the burning of Priestley's house at Fair Hill containing his valuable library. The lecturer reviewed the work of Priestley as a chemical investigator. His earliest study began with "fixed air" or carbon dioxide. In consequence of being near a brewery, Priestley was led to experiment on the fixed air arising from the fermentation vats by studying its effects on burning candles, on living animals, and in water. He noticed that water saturated with the "fixed air" had a pleasant acidulous taste, and he recommended this solution as a substitute for natural aerated water, communicating his discovery to the Royal Society and to the Admiralty. In this way Priestley became the founder of the mineral water industry.

The lecturer also dealt with the discovery of oxygen, or as Priestley called it "dephlogisticated air." He suggested the new gas might prove beneficial for certain morbid conditions of the lungs, or that, being a powerful supporter of combustion, it might be used in producing high temperatures in certain metallurgical operations, such as the melting of platinum. These suggestions had since been put in practice. Professor Morgan traced the subsequent development of oxygen which to-day is produced by liquefaction of air. The quantity now distributed in Great Britain in cylinders is 300 millions of cubic feet a year. One per cent. of the output is used for medical purposes, 3 per cent. for limelight and for experimental work and research ; the rest of the gas is used in industry, metal-cutting representing 59 per cent., welding 25 per cent., and the remainder being used in producing high temperatures for special metallurgical operations.

A Correction

MESSRS. A. BOAKE ROBERTS AND CO., LTD., point out that owing to an error in setting up their advertisement in last week's issue of THE CHEMICAL AGE, the Shawinigan products, Acetic Acid and Carbon Black, were described as "Empire Products made in England." This should, of course, have read "Empire Products made in Canada," Messrs. A. Boake Roberts and Co., Ltd., being the sole importers and distributors for the United Kingdom.

Institute of Chemistry Examination Results

THE following candidates have passed the Examination for for the Associateship :—*In General Chemistry* :—

Allister, Charles Fulton, Heriot-Watt College, Edinburgh ; Austin, Reginald George, University College, Southampton ; Bell, John Lindsay, Heriot-Watt College, Edinburgh ; Brown, John, Heriot-Watt College, Edinburgh ; Browne, Thomas Ethelred Wilby, B.Sc. (Wales), University College, Bognor ; Cochrane, Colin Galbraith, B.Sc. (Lond.), Heriot-Watt College, Edinburgh ; Firth, Herbert, Bradford Technical College ; Fletcher, Albert Edward, Central Technical School, Liverpool ; Hallas, Charles Arthur, B.Sc. (Lond.), Northern Polytechnic Institute and King's College, London ; Lander, Miss Catherine Meads, University College, Nottingham ; McGill, Alexander, Heriot-Watt College, Edinburgh ; Ransome, Gerard Lionel, B.Sc., (Lond.), The University, Cambridge ; Rumford, Frank, Battersea Polytechnic ; White, Walter Arthur, Sir John Cass Technical Institute ; Williams, Kenneth Alan, B.Sc. (Lond.), Chelsea Polytechnic Institute.

Under Regulations prior to March, 1920 (*In Metallurgical Chemistry* :—

Claudet, Richard Arthur Ormerod, B.Sc. (Lond.), King's College, London, and Sir John Cass Technical Institute.

The following candidates have passed the Examination for the Fellowship. *In Branch A : Inorganic Chemistry* :—Morris, Edgar Archibald, B.Sc. (Lond.). *Branch D : Agricultural Chemistry* :—Pyne, Gerald Thomas, A.R.C.Sc.I., B.Sc. (Lond.). *In Branch E : The Chemistry, including Microscopy, of Food and Drugs, and of Water* :—Bagnall, Herbert Henry, B.Sc. (Birm.). *In Branch G : Chemical Engineering* :—Sensicle, Laurence Henry, B.Sc. (Lond.).

Chemical Company's Action

ON Monday, October 20, in the King's Bench Division, Mr. Justice Talbot had before him an action by the Sheppey Glue and Chemical Works, Ltd., of Mark Lane, London, against Mr. E. E. Clinch, a farmer, of Vesey House, Borden Road, Sittingbourne, Kent, to recover two sums of £42 and £11 for manures and fertilisers supplied. Defendant admitted liability in regard to the £11. As to the sum of £42 he said that the time had not arrived for payment and that therefore the action was premature.

Plaintiffs said that on the back of the invoice sent the defendant for the £42 was a new condition that the plaintiffs might call for payment at any time. It was typewritten, and defendant could have seen it had he looked. Defendant replied that there was no indication on the front of the invoice as to any new condition, and his attention was not called to it in any way. If he had observed it, or his attention had been called to it, he should have taken exception to it.

His Lordship held that the typewritten condition as to payment was not part of the contract between the parties, and he gave judgment for the plaintiffs for £11 and for defendant for the £42 with costs.

"Chemistry and Atomic Structure"

FOLLOWING on Sir Oliver Lodge's claim of the atom for the physicists in his recent *Atoms and Rays* comes a new book by Dr. J. D. Main Smith, *Chemistry and Atomic Structure*, in which he re-states the theory of chemistry in the light of the latest knowledge of atomic structure. Professor G. T. Morgan of Birmingham writes in an introduction to the book :—"As the almost inevitable result of the rapid and increasing advance of knowledge in physics and chemistry, students are tempted more and more to hurry over the fundamental concepts of these sciences in order to gain a superficial acquaintance with recently discovered phenomena. The author corrects this unfortunate tendency by devoting the opening chapters of his treatise to the fundamental topics of atoms, molecules, valency, electro-chemistry, and the classification of the elements. A survey of the growth of modern chemistry shows that on these sound foundations has been gradually erected the solid structure of three-dimensional chemistry." The book will be published by Ernest Benn, Ltd., towards the end of October.

From Week to Week

SEWERAGE WORKS costing £85,921 are proposed by Swansea Corporation.

FOUR FATAL ACCIDENTS occurred in the chemical and allied industries during September.

A LARGE GAS METER EXPLODED, causing a fire which resulted in extensive damage to the factory of the Acme Tea Chest Co., at Glasgow, on Friday, October 17.

MR. R. HUNT, of the laboratory staff at the Muspratt works of the United Alkali Co., Ltd., has received presentations from the staff on the occasion of his marriage.

MR. L. S. PALMER, M.Sc., has been appointed Lecturer in Physics at Manchester University and Mr. J. P. Cockcroft, M.Sc., is to be demonstrator in Electro-Chemistry.

SIR RICHARD THREFALL, of the chemistry and fuel board of the Scientific and Industrial Research Council of Great Britain, and Sir Frank Heath, secretary of the Council, recently visited Ottawa.

A TENDER OF £23,652 16s. 9d. for the construction of storm-water and liquefying tanks, separating tanks, filter beds, humus tanks and other works, by W. Withers, of Bilston, has been accepted by Coseley Urban District Council.

THE MONSANTO CHEMICAL WORKS, of St. Louis, U.S.A., in an announcement to the trade, state that the cresylic acid market is strong in England and the recent rise in exchange is bound to affect English cresylic acid in America.

MR. R. J. SARJANT, M.Sc., will give a course of six lectures on "Furnace Heating" at the Mappin Hall of the Applied Science Department of Sheffield University on Thursday evenings at 5.15 p.m. The first lecture will be given on October 30.

THE FOUNDATION CO., LTD., acting on behalf of Messrs. Lafarge, has placed an order with Vickers, Ltd., Barrow-in-Furness, for the first clinker grinding plant, comprising tube mills, installed in this country in connection with the manufacture of Ciment Fondu.

COURTAULDS, LTD., are said to be spending £1,500,000 on their new buildings at Wolverhampton for the manufacture of artificial silk. The firm has purchased the site of the old General Post Office in Cheapside, London, and are proceeding to erect head offices and warehouses.

UNEMPLOYMENT IN THE CHEMICAL MANUFACTURING INDUSTRY on September 22 totalled 8,946—7,498 males and 1,448 females. In the case of the men this figure represents almost 10 per cent. unemployed. There is, however, a slight decrease recorded when compared with the previous month.

THE MEETING OF THE INSTITUTION OF CHEMICAL ENGINEERS arranged for November 12 has been abandoned. In its place a meeting will be held on Wednesday, November 5, at 8 p.m., in University College, Gower Street, London, W.C., when Dr. M. W. Travers, F.R.S., F.I.C., will give a paper on "The Water Gas Process."

THE SEVENTH PUBLIC LECTURE of a series on "Physics in Industry," being given under the auspices of the Institute of Physics, will be on "Electrical Precipitation," and will be delivered by Sir Oliver Lodge on Wednesday, October 29, at 5.30 p.m., at the Institution of Electrical Engineers, Victoria Embankment, London. The chair will be taken by Sir Charles Parsons, President of the Institute.

MR. THOMAS BIDDULPH-SMITH, F.C.S., the new President of the Coke Oven Managers' Association, started his practical career in the engineering shops of the Birchenwood Colliery Co., Ltd., and subsequently entered the laboratory at the same works. Three years later he joined the chemical staff of Crossley Bros., Ltd., Openshaw, Manchester, in connection with the gas engine and gas producer departments. In succession he has been works chemist at the Manvers Main Colliery, and at the Bowden Close works of Pease and Partners, Ltd., Durham, and chief chemist at the low carbonisation plant at Barugh, Barnsley. In 1917 he was appointed manager and chief chemist of the coking and by-product installation of Samuel Fox and Co., Ltd., at Stocksbridge, and in 1922 to a similar position with Dorman, Long and Co., Ltd., Middlesbrough, which position he now holds. He is the author of the book *Coke Oven and By-products Works Chemistry*.

LORD LEVERHULME has purchased Grosvenor House from the Duke of Westminster.

FOR THE RENEWAL OF THEIR SULPHATE PLANT, Newbury Town Council has accepted a tender of £775.

THE MANCHESTER HEALTH COMMITTEE is to make a grant of £25 towards the cost of the smoke abatement conference to be held there in November.

REPORTS FROM AUSTRALIA state that Vickers, Ltd., has offered to associate with the Broken Hill Co. for manufacturing armour plate and shells at their Newcastle works.

AT THE INAUGURATION of the Hood Chair of Mining at Edinburgh University on October 17, Professor H. Briggs gave an address on "The Problem of Low Grade Fuel."

THE BADISCHE ANILIN AND SODA FABRIK is organising the German dye agencies in Japan with a central office and laboratories at various points to aid dye users, according to an American report.

MR. C. LE MAISTRE, of the British Engineering Standards Association, London, is announced to address a meeting of the Mining Institute of Scotland, Glasgow, to-day (Saturday) on "Industrial Standardisation."

MR. E. D. WINKWORTH has resigned his position as president of the Solvay Process Co., the Semet Solvay Co., and the Atmospheric Nitrogen Co. of America. Mr. P. K. Malin has been elected president of all three companies.

MR. EDWARD J. GEORGE, general manager of the Consett Iron Co., announces that the firm contemplates duplicating the new American Fell coke works, remodelling the Templetown coke works, and laying down a large by-product plant near Newcastle.

FOR THE CONSTRUCTION OF DETRITUS TANKS, dosing chambers, bacteria beds, humus tanks, and the alteration of storm and sedimentation tanks, Chapel-en-le-Frith Rural District Council has accepted a tender of £6,503 by P. D. Hayes and Son, of Stockport.

DR. A. T. DE MOUILPIED, of the British Dyestuffs Corporation, and formerly Lecturer in Chemistry in the University of Liverpool, has been appointed to a professorship of science in the Royal Military Academy, Woolwich. He will take up his new duties at the end of January.

EIGHT TRADE DISPUTES are recorded in the chemical industry during the first nine months of this year. These involved 1,000 workers and an aggregate duration of 13,000 working days. In the corresponding period last year there were 11 disputes involving 1,000 workers and an aggregate of 24,000 working days.

THE SECRETARY of the Institution of Petroleum Technologists asks us to state that the title of the paper for which the Boverton Redwood Medal has been awarded to M. Paul de Chambrier is "Working of Petroleum by Means of 'Shafts' and Galleries." The Students' Medal and Prize was awarded to Lieut. J. H. Blakiston, R.N.R.

THE FARADAY SOCIETY with the Geological and Mineralogical Society held a conference on Wednesday on "The Physical Chemistry of Igneous Rock Formation." A number of papers were presented dealing with the formation of minerals in igneous rocks. A paper by Professor W. E. S. Turner dealt with the properties of silicate glasses and their possible bearing on the history of igneous rocks.

OXFORD UNIVERSITY in Congregation on Tuesday, October 21, adopted a decree under which the University agreed to pay certain sums, out of the Government grant, for a period of three years to certain College laboratories which undertook part of the University teaching in different departments of chemistry. Mr. A. Jenkinson, Fellow of Brasenose College, stated that the scheme would make full use of all the existing resources for the teaching of chemistry within the limits of the University.

LONDON UNIVERSITY SENATE has conferred the degree of D.Sc. in Chemistry on Mr. G. E. Foxwell, an external student, for a thesis entitled "Collected Researches into By-Product Coking," and another paper; and on Miss F. M. Hamer, an external student, for a thesis entitled "The Synthesis of an Azocyanine," and other papers.; on Mr. W. N. Bond, an internal student of University College and the Imperial College, Royal College of Science, has been awarded the degrees of D.Sc. in Physics for a thesis entitled "The Flow of Fluids Treated Dimensionally."

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COAL.—The treatment of coals with naphthalene. M. Oswald and R. Pinta. *Chim. et Ind.*, September, 1924, pp. 415–422.

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RUBBER.—The rôle of enzymes in the coagulation of rubber latex. O. de Vries. *Chim. et Ind.*, September, 1924, pp. 449–452.

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KETONES.—Dioxyacetone and a new preparation of methylglyoxal. H. O. L. Fischer and C. Taube. *Ber.*, September 10, 1924, pp. 1502–1507.

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TASTE.—Chemical constitution and the sweetness of organic compounds. H. Thoms. *Z. angew. Chem.*, October 9, 1924, pp. 809–811.

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Miscellaneous

ELECTRO-CHEMISTRY.—Research on the obtention of chromium electrolytically. J. Sigrist, P. Winkler and M. Wantz. *Helv. Chim. Acta*, October 1, 1924, pp. 968–972.

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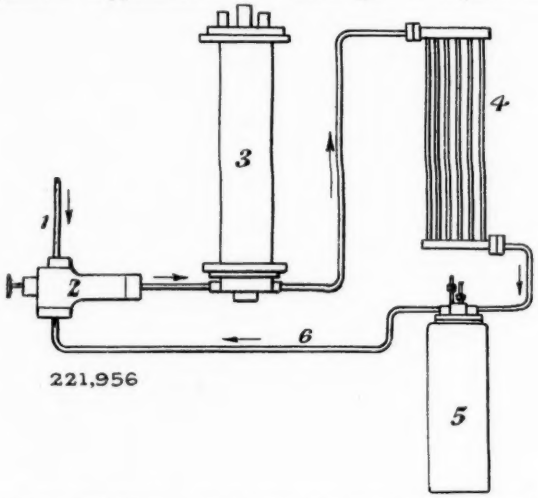
Patent Literature

Abstracts of Complete Specifications

221,956. Catalytic Production of Synthetic Ammonia, Apparatus for. L. Casale, 9, Via del Parlamento, Rome. Application date, September 20, 1923.

In the catalytic production of ammonia, the nitrogen-hydrogen mixture is circulated continuously through the apparatus, supplemented with fresh gas to replace the



ammonia withdrawn. Such circulation may be obtained by a piston or centrifugal pump, but it is then necessary to purify the gas from lubricating oil derived from the pump to prevent the poisoning of the catalytic substance by the oil. The expense of the purification, and also losses by leakage, are avoided in the present invention by employing the freshly introduced gas to circulate the main quantity of gas in the cistern. The fresh gas at a pressure of 10-100 atmospheres above that of the mixture to be circulated is introduced through a pipe 1 to the nozzle of an injector 2 so that it draws in the circulating mixture from the pipe 6. The mixture then passes through the catalytic tube 3, and then through a refrigerator 4 and condensing vessel 5. A filter is provided at the inlet for the fresh gas to the injector 2.

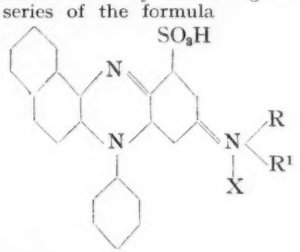
221,843. Intermediate Products for Making Azo-Dyestuffs, Manufacture of. O. Y. Imray, London. From Soc. of Chemical Industry in Basle, Switzerland. Application date, May 17, 1923.

Specification No. 205,525 (See The Chemical Age, Vol. IX, p. 580) describes the use of the chloride or bromide of cyanuric acid in the manufacture of vat dyestuffs of the anthraquinone series, and it is now found that these halides may be used for the manufacture of new intermediate products in making azo dyestuffs. The halides may be used in all cases in which it is advantageous to use an anhydride or a halide of an organic acid, *e.g.*, acetic anhydride, the chloride of benzoic acid or benzene sulphonic acid, or phosgene, and the three atoms of halogen in the cyanuric halide render possible the synthesis of a much larger number of substances all of which contain one or more cyanuric nuclei. These intermediate products may be (1) coupling components, (2) coupling components which are also diazo components, (3) diazo components. These products are obtained by the reaction of one molecular proportion of a cyanuric halide with one, two or three molecular proportions of an aromatic substance having at least one group containing an atom of hydrogen which can react with the halogen of the cyanuric halide. Such groups are NHR (where R is a hydrogen atom or an alkyl or aryl residue), OH, or SH. The aromatic substance must also have a group NR^1R^2 (where R^1 and R^2 are a hydrogen atom or an alkyl or aryl residue), OH or an active methylene group or a group which may be transformed into one of these after the reaction with the cyanuric halide. These aromatic substances may be substituted once or twice by any aliphatic or aromatic substance containing at least one of the above groups capable of reacting with the halogen of cyanuric halide, or water or ammonia.

A large number of examples are given of the manufacture of these products. Those containing at least one amino-naphthol complex per molecule act as coupling components or as coupling and diazo components at the same time. They are obtained by condensing with a cyanuric halide one, two or three molecular proportions of an amino-naphthol adapted to contain other substituents, or by condensing with a cyanuric halide at least one molecular proportion of such an amino-naphthol and one or two molecular proportions of any substance containing a hydrogen atom capable of reacting such as an alcohol, a mercaptan, a phenol, a thiophenol, an amine of various organic series, water, or ammonia. The examples include the use of 1 : 8-amino-naphthol-3'6-disulphonic acid, 2-amino-5-naphthol-7-sulphonic acid, etc. Those intermediate products which do not contain amino-naphthol act as diazo components or both as diazo and coupling components. Examples are given of the use of 1:3-phenylene-diamine-4-sulphonic acid, 1-amino-4-acetyl-amino-3-benzene sulphonic acid, 1:4-acetnaphthylene-diamine-6-sulphonic acid, meta-aminoformanilide, 1(3¹-amino)-phenyl-5-pyrazolone-3-carboxylic acid, a mixture of 1:3-phenylene-diamine-4-sulphonic acid, meta-aminoformanilide, and others.

221,975. New Dyestuffs for Wool of the Safranine Series, Manufacture of. A. G. Bloxam, London. From Akt.-Ges. fur Anilin Fabrikation, Treptow, Berlin. Application date, October 23, 1923.

These dyestuffs are made by converting a derivative of the isorosinduline series of the formula



(in which R and R^1 represent aryl or arylkyl and X an acid residue) or a substitution derivative (including sulphonic acids) of such a derivative into the corresponding safranine di- or trisulphonic acid by oxidising it with an aromatic paradiamine and if necessary sulphonating the product, or alternatively, by oxidising it together with a sulphonic acid of an aromatic paradiamine. The isorosindulines are obtained by condensing a tertiary aromatic amine containing in the 4-position an amino and in the 3-position a sulphonic group with a 2-aryl aminonaphthalene or derivative. In an example, 3-sulphophenyl 2-naphthylamine is obtained by the reaction of 2-oxynaphthalene and 1-aminobenzene-3-sulphonic acid and sodium bisulphite lye, 1-dymethyl-amino-4-aminobenzene-3-sulphonic acid is obtained by reducing the dyestuff derived from any dizao compound and 1-dimethyl-amino-benzene-3-sulphonic acid. A mixture of these two products is then treated with sodium bichromate and acetic acid to obtain isorosinduline disulphonic acid. The intermediate product need not be separated. After oxidation, the solution is run into a mixture of 1:4-diaminobenzene-2-sulphonic acid, caustic soda lye, and sodium sulphite, and a current of air is blown through the solution until a sample of the isolated safranine dissolves in concentrated sulphuric acid to a green solution. The excess of caustic soda is neutralised by sodium bicarbonate, chromium hydroxide is filtered off, and the safranine is precipitated by the addition of salt. Several other examples are given.

221,976. *o-o*-Diacyl Derivatives of Diphenolisatine and its Products of Substitution in the Phenol and Isatine Group. A. Home-Morton, 7 and 8, Idol Lane, London, E.C.3. From F. Hoffmann, La Roche & Co., Akt.-Ges., 184, Grenzacher Strasse, Basle, Switzerland. Application date, October 25, 1923.

The *o-o*-diacyl derivatives of diphenolisatine and its products of substitution in the phenol and isatine group are

obtained by treating diphenolisatine and its products of substitution with acylating agents and heating to a temperature approaching 100°C. These compounds are insoluble in water but are soluble in benzol, alcohol, and concentrated acetic acid, with the exception of *o-o*-diacetyl diphenolisatine. Examples are given of the treatment of diphenolisatine, diguaiacolisatine, diothocresol-chlorisatine, and diorthocresol-isatine. The products are used for therapeutic purposes.

221,999. PURE ANTHRACENE AND PURE CARBAZOL, MANUFACTURE OF. L. Weil, 80, Schlüterstrasse, Hamburg, and Chemische Fabrik in Billwärder vorm, Heil and Sthamer Akt.-Ges., 28, Billbrookdeich, Hamburg-Billbrook, Germany. Application date, November 20, 1923. Addition to 172,966.

Specification No. 172,966 (See THE CHEMICAL AGE, Vol. VI, p. 210) describes the purification of anthracene by distilling the crude material in the presence of petroleum hydrocarbons which distil at 260°-316°C. The product consists of pure anthracene and pure carbazole. In the present invention, caustic potash is also added to the mixture of crude anthracene and hydrocarbons, which is then distilled under ordinary pressure or in vacuo yielding anthracene of more than 93 per cent. purity. Potassium carbazole remains in the residue, and pure carbazole may be obtained by decomposition with water and by distillation. By this process it is possible to treat crude anthracene containing only 20 per cent. of anthracene in a single operation to obtain anthracene of high purity. In an example, the crude anthracene is mixed with gas oil of 0·84 specific gravity and caustic potash, and the mixture distilled under a reflux condenser at 250°C. If the distillation is effected in vacuo, *e.g.*, at 62 cc of mercury, the distillation temperature is about 180°-200°C.

222,001. CELLULOSE ACETATE PRODUCTS, DYEING OF. The Silver Springs Bleaching and Dyeing Co., Ltd., and A. J. Hall, Timbersbrook, Congleton, Cheshire. Application date, November 27, 1923.

It has been found that cellulose acetate products, *e.g.*, artificial silk, are capable of absorbing from aqueous solutions or suspensions the arylamine derivatives prepared by condensing one molecule of 2 : 4-dinitro-chlorobenzene with one molecule of an aromatic compound containing one or more amino groups, but no sulphonic acid groups. An example is given of the preparation of 2 : 4-dinitro-diphenylamine by heating aniline, dinitro-chlorobenzene, chalk, and water to 100° C. for five hours. The product is mainly 2 : 4-dinitro-diphenylamine with small amounts of unchanged reaction materials. The condensation product is treated with dilute hydrochloric acid to remove calcium salts and aniline, washed with water, and then treated with hot caustic soda to convert the dinitro-chlorobenzene into the corresponding dinitro-phenol. The latter is removed by hot water from the insoluble 2 : 4-dinitro-diphenylamine. The cellulose acetate product is immersed in a suspension of the arylamine compound, and heated to 75° C. Assistants such as Turkey-red oil, soap, and ammonia may also be used.

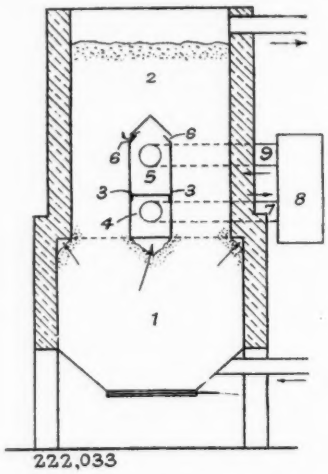
Other suitable arylamine derivatives are 2 : 4-dinitro-2¹-hydroxy-diphenylamine, 2 : 4-dinitro-4¹-hydroxy-diphenylamine, 2 : 4-dinitro-2¹-carboxy-diphenlamine, 2 : 4-dinitro-4¹-amino-diphenylamine, 2 : 4-dinitro-4¹-carboxy-diphenylamine, 2 : 4-dinitro-4¹-acetylamino-diphenylamine, and 2 : 4-dinitro-N-methyl-diphenylamine.

222,031. YELLOW COLOURING MATTER OF THE PYRAZOLONE SERIES. L. B. Holliday and Co., Ltd., A. Clayton and J. A. Stokes, Deighton, Huddersfield. Application date, February 13, 1924.

A mixture of 2 : 5 : 7-naphthyl-hydrazine-disulphonic acid with water and sufficient soda ash to bring the sulphonic acid into solution, is treated with a solution of sodium dioxy-tartrate made strongly acid with concentrated sulphuric acid. The mixture is stirred and heated to 30°–35° C. for two hours, then to 50° C. for two hours, and then to 70° C. for three hours. The solution is cooled to 20° C. and the yellow colouring matter precipitated with salt.

222,033. INTERNALLY HEATED FUEL DISTILLATION SHAFTS. A. L. Mond, London. From Metallbank und Metallurgische Ges. Akt.-Ges., 45, Bockenheimer Anlage, Frankfort-on-Main, Germany. Application date, February 22, 1924.

This distillation apparatus is of the kind in which there is a lower coke cooling chamber surmounted by a distillation chamber. Two partitions 3 are provided between the coke cooling chamber 1 and the distilling chamber 2, extending over the full width of the shaft, and enclosing chambers 4 and 5. The chamber 4 is connected by a passage 7 to a superheater 8, and



222,033

the latter by a passage 9 to the chamber 5. The heating medium passes through the coke in the chamber 1 into the chamber 4, then through the superheater 8 to the chamber 5, and then through the outlets 6 into the fuel in the chamber 2. Modifications of this arrangement are also described.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention : 195,055 (Silica Gel Corporation) relating to the recovery of substances from oils, waxes, and the like, see Vol. VIII, p. 548 ; 201,898 (Naugatuck Chemical Co.) relating to processes for halogenating the substantially dry latices of indiarubber and the like, see Vol. IX., p. 377 ; 213,214 (General Electric Co., Ltd.) relating to manufacture of hard alloys, see Vol. X., p. 47 ; 211,831 (Texas Gulf Sulphur Co.) relating to the burning of sulphur, see Vol. X., p. 447.

International Specifications not yet Accepted

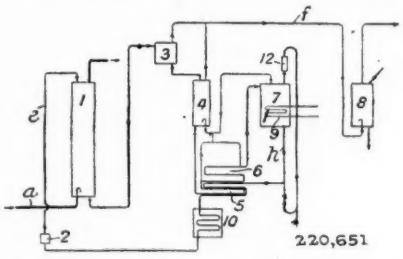
220,649. CATALYSTS. Synthetic Ammonia and Nitrates, Ltd., Billingham, Stockton-on-Tees. (Assignees of W. Schultze, Syracuse, N.Y., U.S.A.) International Convention date, August 16, 1923.

A catalyst for use in the oxidation of carbon monoxide to dioxide by means of steam is compressed dry into tablet form, without a binder, or some water or vaporisable and combustible material such as ammonium carbonate and sugar may be added. In an example, a solution of iron nitrate is mixed with an excess of ground magnesite and a small proportion of potassium bichromate. Iron hydroxide is thus precipitated on magnesite, and the mixture is dried, heated to 700° C., crushed, and moulded into tablets of cylindrical form with convex ends. In another example, iron nitrate solution containing a slight excess of nitric acid is mixed with ammonia to precipitate iron hydroxide. This is dried, heated to 500° C. and moulded. In a further example a paste of hæmatite magnesite, and caustic potash solution is dried, heated to 715° C. and compressed.

220,651. SYNTHESIS OF AMMONIA. Synthetic Ammonia and Nitrates, Ltd., Billingham, Stockton-on-Tees. (Assignees of J. G. Dely, Syracuse, N.Y., U.S.A.) International Convention date, August 16, 1923.

A mixture of nitrogen, hydrogen, and carbon monoxide is treated with steam and a catalyst to convert the carbon monoxide to carbon dioxide and hydrogen. The residue of carbon monoxide is absorbed in ammoniacal copper solution. The gas mixture passes through a pipe *a* to a tower 1, through which ammoniacal copper solution is circulated downwards by a pump 2. The saturated liquor passes through a vessel 3 and tower 4 to a heat interchanger 5, and thence to a steam preheater 6 and regenerating tank 7. The latter is heated to

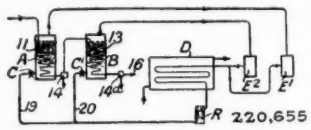
70°–75° C. by a coil 9, and the regenerated liquor passes through a heat interchanger 5 to a brine cooler 10 and back to the pump 2. Air is injected into the liquor in tank 7. The gas liberated in the vessel 3 (hydrogen, nitrogen and carbon monoxide) passes through a pipe *f* to a water scrubber 8 and



then to the catalytic chamber. Ammonia is liberated in the vessels 5, 6, 7, and is absorbed by the cool liquor in the tower 4, and oxygen in the untreated gas is absorbed in the tower 1 by the ammoniacal copper solution.

220,655. Recovering Gaseous Synthetic Ammonia. Synthetic Ammonia and Nitrates, Ltd., Billingham-Stockton-on-Tees. (Assignees of W. H. Kniskern, Syracuse, N.Y., U.S.A.) International Convention date, August 16, 1923.

A gaseous mixture containing ammonia is passed through coils 11, 13, in vessels A, B, containing a cooling liquid, and liquefied ammonia is removed by separators 14, 14A, residual



gas passing out by a pipe 16. The cooling in vessels A, B is effected by expanding liquid ammonia through valves C, C1 at pressures of 25 lb. and 15 lb. absolute, by connecting the outlets of these vessels to compressors E1, E2. The ammonia is then compressed to 155 lb. and forced through a cooling coil D and receiver R back to the expansion valves. Modifications are described in which the ammonia is expanded first in the vessel A, and the residual liquid passed into the vessel B, and in which the ammonia gas is subjected to a second compression and cooling.

Latest Notifications.

223,190. Manufacture of aralkyl resorcinols. Sharp and Dohme, Inc. October 9, 1923.

223,192. Manufacture of 1-phenyl-2·3-dimethyl-4-dimethylamino-5-pyrazolone. Lockemann, Dr. G. October 11, 1923.

223,221. Manufacture of barbituric acid derivatives. Riedel Akt.-Ges, I.D. October 10, 1923.

Specifications Accepted, with Date of Application

201,540. Sulphurised dyestuffs and intermediate products therefor, Manufacture of. Soc. of Chemical Industry in Basle. July 28, 1922.

202,985. Durable compounds containing active oxygen, Process of manufacturing. F. Noll. August 28, 1922.

203,301. White lead, Manufacture of. G. F. Lloyd, F. B. Clapp, and F. H. Campbell. May 1, 1923.

205,101. Distillation of carbonaceous substances. Kohlenveredlung Ges. October 5, 1922.

205,103. Pure table salt, Process for making—in conjunction with electrolysis of salt solutions. E. G. R. Angel. October 6, 1923

206,516. Fuels comprising alcohol and liquid hydrocarbon, Process for preparing. Soc. Ricard, Allenet, et Cie. November 4, 1922.

211,096. Ammonium chloride from ammoniacal hot distillation or generator gases, Method for producing. O. L. Christenson. February 9, 1923.

214,222. Low temperature distillation, Apparatus and process for. A. S. Ramage. April 9, 1923.

217,166. Cellulose solutions, and process for their production. L. Lilienfeld. June 5, 1923.

220,924–5. Fine ores and pulverous ores, Means for sintering—by means of portable sintering vessels. Allmanna Ingeniorsbyran H. G. Torulf. August 22, 1923. Addition to 200,090.

222,530. Concentrating oxidised ores by flotation, Process of. E. C. R. Marks (*Eureka Metallurgical Co.*) May 1, 1923.

222,549. Treating vegetable matter by fermentation to obtain alcohol, acetone and other products. H. R. Norbury, A. P. H. Desborough, A. C. Thaysen, and L. D. Galloway. June 27, 1923.

222,587. Ammonia from gases or vapours, Process of recovering. W. A. Bone and G. I. Finch. July 7, 1923.

222,624. Sulphurised dyestuffs and intermediate products therefor, Manufacture of. Soc. of Chemical Industry in Basle, E. Reber and J. Froehlich. August 17, 1923. Addition to 201,540.

222,661. Rock and minerals, Process for winning. J. Schejbal. September 27, 1923.

222,676. Centrifugal filters, separators and the like. Lilleshall Co., Ltd., and C. A. Bishop. October 9, 1923.

222,718. Alkali metal amides, Manufacture of. T. Ewan. December 8, 1923.

222,748. Sintering and otherwise treating ores, Apparatus for. H. J. Stehli. February 12, 1924.

Applications for Patents

Armstrong, J. J. V. (Naamlooze Vennootschap Algemeene Chemische Productenhandel). Separation of vaporised organic substances from gaseous mixtures. 24,795. October 18.

Bloxam, A. G. (Haco-Ges. Akt.-Ges. Bern). Manufacture of compounds of alkaloids. 24,377. October 14.

Carbide and Carbon Chemicals Corporation and Marks, E. C. R. Processes of rectifying hydrocarbon mixtures. 24,833. October 18.

Carpmael, W., and Farbenfabriken vorm. F. Bayer and Co. Manufacture of azo dyestuffs. 24,592. October 16.

Carpmael, W., and Farbenfabriken vorm. F. Bayer and Co. Manufacture of esters of saccharides, etc. 24,835. October 18.

Carpmael, W., and Kaiser, K. Manufacture of formaldehyde. 24,755. October 17.

Coke and Gas Ovens, Ltd., and Pearson, R. Neutralising free acid sulphate of ammonia. 24,493. October 15.

Coles, S. O. Cowper. Recovery of zinc from zinc residues. 24,563. October 16.

Coley, H. E., and Hornsey, J. W. Rotary furnaces, etc. 24,184. October 13. Method of sealing rotary kilns, etc. 24,185. October 13.

Coley, H. E., and Hornsey, J. W. Production of magnetic oxide of iron. 24,188. October 13.

Evans, A. J. Recovery of ferrous sulphate from waste pickle. 24,171. October 13.

Fairbrother, H. Distillation of carbonaceous material. 24,232. October 13.

Farbenfabriken vorm. F. Bayer and Co. Manufacture of dyestuffs. 24,753. October 17. (Germany, October 18, 1923.) Manufacture of lithopone. 24,754. October 17. (Germany, November 30, 1923.)

Haco-Ges. Akt.-Ges. Bern. Manufacture of compounds of alkaloids. 24,377. October 14.

Harris, J. E. G., Jones, J. I. M., Morton, J., Morton Sundour Fabrics, Ltd., Wilson, J., and Wylam, B. Dyes and dyeing. 24,608. October 16.

Hefti, F., and Schnorf, C. Production of acridine derivatives, etc. 24,305. October 14.

Knight, L. Water-softening apparatus. 24,628. October 16.

Soc. Alsacienne de Produits Chimiques. Dyeing of artificial silk. 24,843. October 18. (France, November 3, 1923.)

Soc. d'Etude des Agglomérés. Production of pure oxide of zirconium. 24,468. October 15. (France, October 17, 1923.)

Vidal, R. Preparation of fatty acids, etc. 24,822. October 18. (France, October 19, 1923.)

Smokeless Fuel Test

A test by the Director of Fuel Research on the Parker Low temperature carbonisation plant installed at Barnsley, at the works of the Low Temperature Carbonisation, Ltd., is the subject of a report issued by the Department of Scientific and Industrial Research. The yields of products per ton of coal were as follows :—

Coke	13·92 cwt.
Gas	5,620 c. ft. or 39·6 therms
Tar	18·62 gallons
Liquor	26·00 gallons
Crude Spirit	1·78 gallons
Ammonium sulphate	13·55 lb.

The coke or smokeless fuel produced was of a very suitable size (1 in. to 3 in. pieces), was not friable, and contained only 4·6 per cent. of breeze. Analysis of this coke showed that it contained rather a low percentage of volatile matter (approximately 4 per cent.). When burned in a household grate it was readily ignited and gave a good, hot fire.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.

London, October 23, 1924.

HOME trade business continues to be moderately satisfactory and the demand if anything during the current week has been slightly better, generally speaking prices are firmer while the undertone is quite healthy. Export business still continues brisk and a satisfactory volume of business has been put through.

General Chemicals

ACETONE is firm and slightly higher at £94 10s. per ton ex wharf; stocks are light.

ACID ACETIC continues in steady demand and price is unchanged at £44 per ton for technical 80% and £45 per ton for pure.

ACID CITRIC remains stagnant and no interest is being taken in the market.

ACID FORMIC continues moderately active and is unchanged at £53 per ton ex wharf.

ACID LACTIC has been in better demand and is quoted to-day at £43 per ton for the 50% by weight.

ACID OXALIC is very steady and the demand inclined to broaden; price is unchanged at 4d. per lb.

ACID TARTARIC.—This market is still stagnant but there are indications that better conditions will prevail before long; price is unchanged.

ALUMINA SULPHATE continues in buyers' favour, although a better feeling is now in existence; price remains unchanged at £7 5s. per ton for 17/18%.

ARSENIC remains quiet and in little demand at £44 per ton.

BARIUM CHLORIDE has been quite active and is very steady at £12 10s. per ton.

COPPER SULPHATE has been more active and Continental prices tend to become higher, the average figure to-day may be taken at between £22 10s. and £23 per ton.

CREAM OF TARTAR is slightly firmer and is quoted at about £91 per ton on the spot.

FORMALDEHYDE is moderately active and the value is unchanged at £50 per ton.

EPSOM SALTS are in keen demand and the price tends to become higher.

LEAD ACETATE is higher and is in good demand at the advanced figure of £45 10s. per ton for white and £44 per ton for brown.

LEAD NITRATE is also very firm and is quoted at £43 10s. per ton.

LIME ACETATE is weak with grey nominally standing at £15 per ton and brown at £11 10s. per ton.

MAGNESIUM CHLORIDE is only in moderate demand and price is unchanged.

METHYL ALCOHOL is steady and in fair request at £60 per ton.

POTASSIUM CAUSTIC has been in moderate inquiry and is now quoted at about £30 10s. ex warehouse.

POTASSIUM BICHROMATE is quiet and in small request at 5½d. per lb. delivered.

POTASSIUM CARBONATE is harder and business has been done at over £23 per ton c.i.f. U.K. ports.

POTASSIUM PERMANGANATE maintains its advance and is firm at 7¼d. per lb.

POTASSIUM PRUSSIATE is inclined to go higher and the demand is active at 7½d. per lb.

SODIUM ACETATE is only in small request and price is unchanged at £22 10s. per ton.

SODIUM HYPOSULPHITE is unchanged and a fair amount of business has been put through at round about £9 5s. per ton.

SODIUM NITRITE shows little change and is firm at £25 per ton.

SODIUM PRUSSIATE has been in much better demand and price is firm at 4¼d. per lb.

SODIUM SULPHIDE unchanged at British makers' figures.

Coal Tar Products

There is little change to report in the market for coal tar products since last week.

90% BENZOL is firm at 1s. 4d. to 1s. 5d. per gallon on rails.

PURE BENZOL is worth 1s. 7d. to 1s. 8d. per gallon on rails.

CREOSOTE OIL remains steady at 5¼d. to 5½d. per gallon on rails in the North, and 6d. to 6¼d. per gallon in the South.

CRESYLIC ACID remains quiet. The pale quality 97/99% is quoted at 1s. 11d. per gallon on rails, while the dark quality 95/97% is quoted at from 1s. 7d. to 1s. 7½d. per gallon on rails.

SOLVENT NAPHTHA is distinctly firmer, and is worth from 1s. to 1s. 1d. per gallon on rails.

HEAVY NAPHTHA is also firm, and is quoted at from 11d. to 1s. per gallon on rails.

NAPHTHALENES.—The low-grade qualities are plentiful, and are quoted at from £3 10s. to £4 10s. per ton on rails, while of the higher grades, the 76/78° quality is offered at from £6 to £6 10s. per ton, and 74/76° quality at from £5 10s. to £6 per ton.

PITCH.—The demand remains satisfactory and prices are maintained. To-day's values are 45s. to 50s. f.o.b. London and 42s. 6d. to 45s. f.o.b. east and west coast.

SULPHATE OF AMMONIA.—There are no new features to report.

Nitrogen Products Market

THE export position is unchanged, price still £13 15s. per ton f.o.b. for prompt shipment, and £14 to £14 10s. per ton for forward, in accordance with position. The export market is still fairly quiet.

In the home trade prices for November and December have now been announced, being £14 6s. and £14 8s. respectively, for neutral quality, basis 21·1 per cent. nitrogen, delivered to consumers' nearest station. The market for Nitrate of Soda is unaltered.

American Market Movements

(From *Drug and Chemical Markets.*)

INDUSTRIAL chemicals have been more or less routine during the week. The price situation is practically unchanged. Contract business in domestic sodium prussiate for 1925 delivery is reported good. Announcement of 1925 alkali prices is expected within the next week or two. Scarcity of benzol is the outstanding feature in the market for coal and coal-tar by-products. Prompt shipment is uncertain and premiums are being paid for immediate delivery. Business in intermediates has been showing improvement. Linseed oil is stronger again and crushers are naming higher prices for spot owing to scarcity. Chinawood oil is retaining its strength. Cottonseed oil and tallow are recovering from their recent slump. Rosins and turpentine are higher.

Fine chemicals are firm. Active business is reported in codliver oil. Bromides are firm and active. Alcohol and fusel oil are in active demand. Menthol is nominal at $13.25 pound.

Essential oils are quiet. Oil peppermint is still strong. Oil cassia is higher on spot, but for shipment is named lower. Oil cedar wood is firm and active. Oil caraway is easy.

Tariff Changes

POLAND.—A revised list of articles subject to payment of export duties when exported from Poland includes:—Gas tar (crude), ores, slags, certain metals, cellulose (pulp prepared by chemical process from rags, wood, straw, etc.), dry and moist.

GERMANY.—Reports state that the German Government is to announce the abolition of one-third of the existing import prohibitions.

Orphans' Day

NEXT Tuesday (October 28) is Orphans' Day, when commercial travellers all over the kingdom make a special collection among themselves in aid of the Royal Commercial Travellers' School at Pinner, which is now maintaining and educating nearly 400 orphans. This special Orphans' Day effort was established in 1856 to commemorate the opening of the present school buildings by the late Prince Consort, and has been continued regularly for nearly seventy years.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at sellers' works.

General Heavy Chemicals

Acid Acetic 40% Tech.—£23 10s. per ton.

Acid Boric, Commercial.—Crystal, £45 per ton. Powder, £47 per ton

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.

Acid Nitric 80° Tw.—£21 10s. to £27 per ton, makers' works according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £11 d/d.; Contract, £10 d/d. 4 ton lots

Bisulphite of Lime.—£7 10s. per ton, packages extra.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride.—£5 17s. 6d. per ton d/d.

Copper Sulphate.—£25 per ton.

Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d. Normal business.

Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5½d. per lb.

Potassium Chlorate.—3d. to 4d. per lb.

Salammoniac.—£32 per ton d/d.

Salt Cake.—£3 10s. per ton d/d.

Soda Caustic, Solid.—Spot lots delivered, £16 7s. 6d. to £19 7s. 6d per ton, according to strength; 20s. less for contracts.

Soda Crystals.—£5 5s. to £5 10s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£24 per ton.

Sodium Bicarbonate.—£10 10s. per ton carr. paid.

Sodium Bichromate.—4½d. per lb.

Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.

Sodium Chlorate.—3d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Sulphide conc. 60/65.—About £14 10s. per ton d/d.

Sodium Sulphide Crystals.—£9 per ton d/d.

Sodium Sulphite, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—6¼d. to 6½d. per lb. Quiet. Crude 60's 1s. 9d. per gall. Market flat.

Acid Cresylic 97/99.—2s. to 2s. 1d. per gall. Demand fair. Pale 95%, 1s. 10d. to 2s. per gall. Better inquiry. Dark, 1s. 9d. to 2s. per gall. Fairly steady.

Anthracene Paste 40%.—4d. per unit per cwt. Nominal price. No business.

Anthracene Oil, Strained.—6¼d. to 6½d. per gall. Small demand. Unstrained, 6d. to 6¼d. per gall.

Benzol.—Crude 65's.—7¼d. to 9d. per gall., ex works in tank wagons. Standard Motor, 1s. 1½d. to 1s. 3d. per gall., ex works in tank wagons. Pure, 1s. 5½d. to 1s. 7d. per gall., ex works in tank wagons.

Toluol.—90%, 1s. 5d. to 1s. 5½d. per gall. Pure, 1s. 8d. to 1s. 9d. per gall. Small demand for home consumption.

Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall. Prices reduced.

Creosote.—Cresylic, 20/24%, 8d. per gall. Little demand. Middle Oil, Heavy, Standard specification, 5½d. to 6d. per gall., according to quality and district. A little more demand for export in bulk.

Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. to 1s. 3d. per gall. Demand good. Solvent 90/190, 11d. to 1s. per gall. Fair inquiry. Local demand good.

Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £2 15s. to £5 10s. per ton. Very dull, no demand. Whizzed or hot pressed, £6 to £9 per ton. Demand very poor.

Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to district.

Pitch.—Medium soft, 40s. to 45s. per ton, f.a.s. Plenty of inquiry, prospects brighter. Price too low to interest distillers.

Pyridine.—90/160, 19s. per gall. Steady demand. Heavy, 12s. to 12s. 6d. Market dull.

Intermediates and Dyes

Normal business in dyestuffs has been maintained, and users seem to have more confidence.

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.

Acid H.—3s. 11d. per lb. 100% basis d/d.

Acid Naphthionic.—2s. 4d. per lb. 100% basis d/d.

Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.

Acid Salicylic, technical.—1s. 1d. per lb. Improved demand.

Acid Sulphanilic.—9d. per lb. 100% basis d/d.

Aluminium Chloride, anhydrous.—1s. per lb. d/d.

Aniline Oil.—8d. per lb. naked at works.

Aniline Salts.—8½d. per lb. naked at works.

Antimony Pentachloride.—1s. per lb. d/d.

Benzidine Base.—3s. 11d. per lb. 100% basis d/d.

Benzyl Chloride 95%.—1s. 1d. per lb.

p-Chlorphenol.—4s. 3d. per lb. d/d.

p-Chloraniline.—3s. per lb. 100% basis.

o-Cresol 19/31° C.—4½d. per lb. Rather quiet.

m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

Dichloraniline.—2s. 3d. to 3s. per lb.

Dichloraniline S. Acid.—2s. 6d. per lb. 100% basis.

p-Dichlorbenzol.—£85 per ton.

Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.

Dimethylaniline.—2s. 2½d. per lb. d/d. Drums extra.

Dinitrobenzene.—9d. to 10d. per lb. naked at works.

Dinitrochlorbenzol.—£84 10s. per ton d/d.

Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.

Diphenylaniline.—2s. 10d. per lb. d/d.

Monochlorbenzol.—£63 per ton.

B-Naphthol.—1s. per lb. d/d.

a-Naphthylamine.—1s. 3½d. per lb. d/d.

B-Naphthylamine.—4s. per lb. d/d.

m-Nitraniline.—4s. 2½d. per lb. d/d.

p-Nitraniline.—2s. 2½d. per lb. d/d.

Nitrobenzene.—5½d. to 5¾d. per lb. naked at works.

o-Nitrochlorbenzol.—2s. per lb. 100% basis d/d.

Nitronapthalene.—10½d. per lb. d/d.

p-Nitrophenol.—1s. 9d. per lb. 100 % basis d/d.

p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.

m-Phenylene Diamine.—3s. 10d. per lb. d/d.

p-Phenylene Diamine.—10s. 2d. per lb. 100% basis d/d.

R. Salt.—2s. 4d. per lb. 100% basis d/d.

Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.

o-Toluidine.—10d. per lb.

p-Toluidine.—3s. per lb. naked at works.

m-Toluylene Diamine.—3s. 10d. per lb. d/d.

Wood Distillation Products

Acetate of Lime.—Brown £11 to £11 10s. per ton d/d. Grey £15 per ton. Liquor, 9d. per gall. 32° Tw.

Charcoal.—£7 15s. to £9 5s. per ton, according to grade and locality. Demand quiet, but price steady.

Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.

Red Liquor.—10d. to 1s. per gall. 14/15° Tw.

Wood Creosote.—2s. 9d. per gall. Unrefined.

Wood Naphtha, Miscible.—4s. 9d. per gall. 60% O.P. Market dull. Solvent, 5s. 6d. per gall. 40% O.P. Firmer.

Wood Tar.—£4 5s. per ton. Very quiet.

Brown Sugar of Lead.—£43 per ton. Cheaper.

Rubber Chemicals

Antimony Sulphide.—Golden, 6½d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 11d. per lb.

Barytes.—£3 10s. to £6 15s. per ton, according to quality.

Cadmium Sulphide.—3s. 9d. to 4s. per lb., according to quantity.

Carbon Bisulphide.—£30 to £33 per ton, according to quantity. Again dearer.

Carbon Black.—7d. to 7½d. per lb., ex-wharf. Dearer.

Carbon Tetrachloride.—£60 to £65 per ton, according to quantity, drums extra. Again dearer.

Chromium Oxide, Green.—1s. 3d. per lb.

Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.

Lamp Black.—£48 per ton, barrels free.

Lead Hyposulphite.—7½d. per lb.

Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London.

Sulphur.—£10 to £12 per ton, according to quality
Sulphur Chloride.—4d. per lb., carboys extra. Dearer.
Sulphur Precip. B.P.—£47 10s. to £52 10s. per ton according to quantity.
Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 1d. per lb. Dearer.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£47 per ton. Firmer.
Acid, Acetyl Salicylic.—3s. 1d to 3s. 3d. per lb, according to quantity. Sales steady Price firm.
Acid, Benzoic B.P.—2s. 6d. per lb. Cheaper.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 3½d. to 1s. 4½d. per lb., less 5% for ton lots. Market very weak.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in 2 cwt. lots.
Acid, Pyrogallic, Crystals.—6s. 9d. per lb. for 1 cwt. lots. Market firm. Increasing demand.
Acid, Salicylic.—1s. 6d. to 1s. 8d. per lb, according to quantity.
Acid, Tannic B.P.—2s. 10d. per lb. Market quiet.
Acid, Tartaric.—1s. 1½d. per lb., less 5%.
Amidol.—9s. per lb. d/d.
Acetanilide.—2s. per lb. for quantity. More inquiry.
Amidopyrin.—16s. 6d. per lb. for spot stocks.
Ammonium Benzoate.—3s.3d.to 3s.6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—14s. 3d. per lb. Cheaper.
Benzonaphthol.—5s. 3d. per lb. Small inquiry.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—10s. 6d. to 12s. 6d. per lb.
Bismuth Citrate.—10s. 3d. to 12s. 3d. per lb.
Bismuth Salicylate.—9s. 0d. to 11s. 0d. per lb.
Bismuth Subnitrate.—9s. 8d. to 10s. 8d. per lb.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 4d. to 1s. 7d. per lb.; sodium, 1s. 5d. to 1s. 8d. per lb.; ammonium, 1s. 6d. to 1s. 9d. per lb. Market firm and prices advancing.
Calcium Lactate—1s. 5d. to 1s. 7d., according to quantity. Fair demand and steady market.
Chloral Hydrate.—4s. to 4s. 3d. per lb. Slightly dearer. Spot supplies short.
Chloroform.—2s. per lb. for cwt. lots. Very steady.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£48 per ton, in barrels ex wharf London.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—10s. per lb.
Hexamine.—3s. per lb. Forward prices higher.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—2s. 1d. to 2s. 5d. per lb., according to quantity.
Magnesium Carbonate.—Light Commercial, £36 per ton net.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 1s. 6d. to 2s. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 55s. per lb. Prices show signs of recovery. Synthetic, 26s. to 35s. per lb. Increasing demand.
Mercurials.—Market very quiet. Red oxide, 5s. 3d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 6d. to 3s. 7d. per lb.; white precipitate, 4s. 7d. to 4s. 8d. per lb.; Calomel, 3s. 11d. to 4s. per lb.
Methyl Salicylate.—1s. 10d. to 2s per lb. Seasonal increase in demand.
Methyl Sulphonel.—24s. per lb. Slightly weaker.
Metol.—11s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 8d. for B.P. Quality.
Paraldehyde.—1s. 4d. to 1s. 6d. per lb., in free bottles and cases. Supplies plentiful.
Phenacetin.—5s. 9d. per lb.
Phenazone.—7s.
Phenolphthalein.—5s. 9d. per lb.
Potassium Bitartrate 99/100% (Cream of Tartar).—88s. per cwt. less 2½% for ton lots. Firm market. Prices have upward tendency.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb. Dearer.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Good steady demand.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Forward prices higher.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Good market.
Resorcin.—5s. 6d. per lb.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s 9d. per lb, for cwt. lots.
Silver Proteinate.—9s. 6d. per lb.
Sodium Benzoate, B.P.—2s. 6d. per lb. Ample supplies of good quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton. according to quantity, d/d. consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb. Less for quantity.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 82s. 6d. per cwt., according to quantity. Market steady, good demand.
Sodium Salicylate.—Powder, 2s. to 2s. 3d. per lb. Crystal, 2s. 2d. to 2s. 5d. per lb. Flake, 2s. 6d. per lb.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb., according to quantity.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity. 1 cwt. kegs included.
Sulphonal.—15s. 6d. per lb. Little demand.
Thymol.—17s. 6d. per lb.

Perfumery Chemicals

Acetophenone.—12s. per lb.
Aubepine.—15s. 3d. per lb. Advanced.
Amyl Acetate.—2s. 9d. per lb. Dearer.
Amyl Butyrate.—6s. 9d. per lb.
Amyl Salicylate.—3s. 3s. per lb. Dearer.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
Benzaldehyde free from Chlorine.—3s. 6d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—18s. 9d. per lb. Advanced.
Coumarin.—19s. 6d. per lb. Cheaper.
Citronellol.—17s. per lb. Again advanced.
Citral.—8s. per lb. Cheaper.
Ethyl Cinnamate.—12s. 6d. per lb. Cheaper.
Ethyl Phthalate.—3s. 3d. per lb.
Eugenol.—10s. per lb. Cheaper.
Geraniol (Palmarosa).—33s. 6d. per lb.
Geraniol.—11s. 6d. to 18s. 6d. per lb.
Heliotropine.—6s. 9d. per lb. Cheaper.
Iso Eugenol.—15s. 9d. per lb.
Linalol ex Bois de Rose.—26s. per lb.
Linalyl Acetate.—26s. per lb.
Methyl Anthranilate.—9s. 6d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb. Dearer.
Musk Xylol.—13s. 6d. per lb. Again cheaper.
Nerolin.—4s. 9d. per lb. Advanced.
Phenyl Ethyl Acetate.—15s. per lb. Advanced.
Phenyl Ethyl Alcohol.—16s. per lb.
Rhodinol.—55s. per lb. Cheaper.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 4d. per lb. Cheaper.
Vanillin.—25s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—2s. 8d. per lb.
Bergamot Oil.—16s. 6d. per lb.
Bourbon Geranium Oil.—33s. 6d. per lb. Cheaper.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—10s. per lb. Cheaper.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—9s. 9d. per lb.
Citronella Oil.—Java, 85/90%, 5s. 9d. per lb. Ceylon, 3s. 6d. per lb. Dearer.
Clove Oil.—7s. 9d. per lb. Dearer.
Eucalyptus Oil, 70/75%.—2s. 3d. per lb. Cheaper.
Lavender Oil.—French 38/40% Esters, 28s. 6d. per lb.
Lemon Oil.—3s. per lb.
Lemongrass Oil.—4s. 6d. per lb.
Orange Oil, Sweet.—11s. per lb.
Otto of Rose Oil.—Bulgarian, 40s. per oz. Dearer. Anatolian, 18s. per oz.
Palma Rosa Oil.—16s. 6d. per lb. Cheaper.
Peppermint Oil.—Wayne County, 30s. per lb. Higher prices anticipated. Japanese, 18s. per lb. Practically unobtainable for spot or near delivery. English, 65s. per lb.
Petitgrain Oil.—9s. 3d. per lb.
Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, October 23, 1924.

THE improvement in business recorded last week has not been maintained, possibly owing to the present political situation. Prices, nevertheless, are in the main steady, with most continental products showing a higher tendency.

Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £57 to £68 per ton; 80% pure, £45 to £47 per ton; 80% technical, £44 to £46 per ton. All packed in casks delivered c.i.f. U.K. ports, duty free.

ACID BORACIC.—Remains unchanged. Crystal or granulated £45 per ton; powdered £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Still in little demand, quoted 6d. per lb. delivered.

ACID CITRIC, B.P. CRYSTALS.—Now on offer at 1s. 3¾d. per lb., less 5%, ex store. Offered for early delivery at about 1s. 3½d. per lb., less 5%, ex wharf.

ACID FORMIC, 85%.—Spot material on offer at about £54 per ton, ex store. Quoted £50 to £51 per ton, c.i.f., U.K. ports, duty free.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Quoted 3¾d. per lb., c.i.f. U.K. port, prompt shipment from the continent. Some spot lots available at about the same figure.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—On offer for prompt shipment at 11¾d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—17/18%, iron free, quoted £6 17s. 6d. per ton, c.i.f. U.K. port, prompt shipment. Spot lots available at about £7 17s. 6d. per ton, ex store.

ALUM.—Ammonium chrome alum, £18 to £19 per ton, according to quality, f.o.b. U.K. port. Lump potash alum quoted from the continent, £8 5s. per ton, c.i.f. U.K. port. Spot lots available at £9 12s. 6d. per ton, ex store.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks delivered U.K. port.

AMMONIA LIQUID 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantity, containers extra.

AMMONIA MURIATE.—Grey galvanisers' cystals of English manufacture, unchanged at £30 per ton, ex station. On offer from the continent at about £28 7s. 6d. per ton, c.i.f. U.K. port. Fine white crystals offered from the continent at £24 10s. per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—In little demand. Nominally £50 per ton, ex store, spot delivery. Moderate inquiry for export.

BARIUM CARBONATE.—98/100%, powdered, offered from the continent at £9 12s. 6d. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—Offered from the continent at £11 15s. per ton, c.i.f. U.K. port. Spot material on offer at about £13 per ton, ex store.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station, contracts 20s. per ton less.

BORAX.—Granulated £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. On offer from the continent at about £4 17s. 6d. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks, free.

COPPER SULPHATE.—Inclined to be higher. Continental material now quoted £24 per ton, ex wharf. English material for export about £24 15s. per ton, f.o.b. U.K. port.

FORMALDEHYDE 40%.—Unchanged at about £50 to £51 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Fine white crystals on offer from the continent at about £3 per ton, c.i.f. U.K. port. Large crystals 17s. 6d. per ton extra.

LEAD, RED.—Imported material unchanged at about £41 per ton, ex store.

LEAD, WHITE.—Now quoted at £44 per ton, ex store.

LEAD, ACETATE.—Rather better inquiry. White crystals quoted £45 15s. per ton, ex store, spot delivery. Offered from the continent at about £43 10s. per ton, c.i.f. U.K. port. Brown quoted £40 per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton, ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Still higher quotations from the continent. Now quoted £5 per ton, c.i.f. U.K. port. Some spot lots still available at about the same figure.

POTASH CAUSTIC, 88/92%.—Continental offers advanced to about £30 10s. per ton, c.i.f. U.K. port. Some spot lots still available at £31 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5½d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Quoted £22 17s. 6d. per ton, c.i.f. U.K. port, prompt shipment. Spot lots unchanged at about £24 15s. per ton, ex store.

POTASSIUM CHLORATE.—Unchanged at about 2¾d. per lb., ex wharf, prompt shipment from the continent. Spot lots available at about the same figure.

POTASH NITRATE, SALTPETRE.—Quote £26 per ton, c.i.f. U.K. port, prompt shipment from the continent. Spot lots on offer at £28 15s. per ton, ex store.

POTASSIUM, PERMANGANATE, B.P. CRYSTALS.—Quotations from the continent advanced to about 7½d. per lb. ex wharf, spot lots now quoted 8d. per lb. ex store. Commercial quality offered at about 7¼d. per lb. ex store.

POTASSIUM, PRUSSIATE, YELLOW.—Quoted 7d. per lb. ex store, spot delivery. On offer for prompt shipment from the continent at about 6¾d. per lb. c.i.f. U.K. port.

SODA, CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station spot delivery. Contracts 20s. per ton less.

SODIUM, ACETATE.—Now quoted £22 5s. per ton c.i.f. U.K. port. Spot lots on offer at about £23 5s. per ton ex store.

SODIUM, BICARBONATE.—Refined recrystallised quality £10 10s. per ton ex quay or station. M.W. quality 30s. per ton less.

SODIUM, BICHROMATE.—Unchanged at 4¼d. per lb. delivered.

SODIUM, CARBONATE, SODA CRYSTALS.—£5 to £5 5s. per ton ex quay or station. Powdered or pea quality £1 7s. 6d. per ton more. Alkali, 58 per cent., £8 12s. 3d. per ton ex quay or station.

SODIUM, HYPOSULPHITE.—English material unchanged at £10 per ton ex station. Continental quoted £8 10s. per ton c.i.f. U.K. port. Spot lots available at about £9 15s. per ton ex store. Pea crystals of English manufacture unchanged at £13 15s. per ton ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 7s. 6d. per ton ex store. 96/98% refined quality quoted 7s. 6d. per ton extra.

SODIUM NITRATE, 100%.—Unchanged at about £26 per ton ex store.

SODIUM PRUSSIATE, YELLOW.—Unchanged at about 4d. per lb. ex store, spot delivery. In very little demand.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption £3 10s. per ton f.o.r. works. Good inquiry for export.

SODIUM SULPHIDE.—60/65% solid of English manufacture £14 15s. per ton ex station; broken £1 per ton more; flake £2 per ton more. 60/62% solid of continental manufacture now quoted £12 17s. 6d. per ton c.i.f. U.K. port; broken £1 per ton more. 31/34% crystals of English manufacture £9 2s. 6d. per ton ex station. 30/32% crystals of continental manufacture quoted £8 15s. per ton c.i.f. U.K. port.

SULPHUR.—Flowers £9 10s. per ton; roll £8 10s. per ton; rock £8 7s. 6d. per ton; ground £8 5s. per ton; ex store. Prices nominal.

ZINC CHLORIDE.—98/100% solid, offered from the continent at about £24 5s. per ton c.i.f. U.K. port. 96/98% quoted £23 10s. per ton c.i.f. U.K. port. English material for export about £26 per ton f.o.b. U.K. port.

ZINC SULPHATE.—Spot lots now quoted £12 15s. per ton ex store. On offer from the continent at about £11 15s. per ton c.i.f. U.K. port.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Good home and export inquiries, price 1s. 3½d. per lb.

BRONNER ACID.—Export inquiry, price quoted 7s. 3d. per lb. 100% basis.

BENZIDINE BASE.—Export inquiries, price 3s. 8d. per lb. 100% basis.
BENZALDEHYDE.—Good home demand, price 2s. 3d. per lb. delivered.
BENZOYL PEROXIDE.—Some home inquiry, price quoted 9s. per lb. carriage paid.
BETA OXY NAPHTHOIC ACID.—Moderate inquiry, price 8s. 6d. per lb. delivered.
CLEVES ACID.—Some home and export inquiries, price 3s. 3d. per lb. delivered or f.o.b.
CHROMOTROPE ACID.—Demand infrequent, price 6s. 4d. per lb. 100% basis.
J ACID.—Export inquiry, price 8s. per lb. 100% basis.
LAURENTS ACID.—Home and export inquiries, price 6s. per lb. 100% basis, delivered or f.o.b.
META TOLUYLENE DIAMINE.—Export inquiries, price 3s. 10d. per lb. f.o.b.
NEVILLE WINTHER ACID.—5s. 6d. per lb. 100% basis.
ORTHO ANISIDINE.—Some small inquiry, price 10s. 6d. per lb. delivered.
ORTHO TOLUIDINE.—Some small inquiry, supplies offered at 7½d. per lb. delivered, returnable drums.
PARANITRANILINE.—Export inquiry good, price 2s. 2½d. per lb. f.o.b.
R SALT.—Fairly good demand, price 2s. 4d. per lb. 100% basis.
SULPHANILIC ACID.—Good export inquiry, price 9d. per lb. 100% basis, f.o.b.
TOBIAS ACID.—Some home inquiry, price 4s. 6d. per lb. 100% basis.
TOLIDINE.—Export inquiry, price 7s. per lb. 100% basis.

Sulphate of Ammonia Prices

THE British Sulphate of Ammonia Federation announces that the price of sulphate of ammonia for home agricultural use for November delivery will be £14 6s. per ton (an advance of 2s. on October prices), and for December delivery £14 8s. per ton for neutral quality in fine friable condition free from lumps, basis 21·1 per cent. nitrogen. Limited quantities of ordinary quality will be available in some districts and will be sold at 23s. less than the above prices, basis 20·7 per cent. nitrogen.

In the circular containing this announcement the Federation states that:—"In accordance with our usual practice, we are advancing our prices slightly month by month, but the prices named are still about 20 per cent. under the parity of the retail prices for nitrate of soda.

"In order to avoid risk of disappointment in the spring it is desirable that a certain portion of home requirements should be bought for early delivery. Neutral sulphate of ammonia, if stored in a dry and suitable building, will keep indefinitely in good condition and without loss." It is understood that quantities purchased at the prices stated are for home agricultural purposes only, and the contracts contain a clause prohibiting export. Prices for January will be announced later.

Franco-German Potash Agreement

THE French Bureau of Information in U.S.A. has announced that the Franco-German potash agreement provides that the Alsatian mines will supply 37·5 per cent. and the German mines 62·5 per cent. of their total potash deliveries to the United States. Of sulphates Germany will supply 35,000 tons and Alsace 5,000. This preferential treatment granted to Germany for sulphates raises her percentage to 62·8, and the Alsace rate is reduced to 31·2. Of the 200,000 tons of pure potash usually taken each year by the American market, the German mines are supplying 131,500 tons and the Alsatian 68,500. If the orders received from America should exceed those figures, the same proportion is to be maintained. If one party does not supply the quantities ordered, the other party will deliver them, but will have to pay to the first party 15 per cent. of their value. Prices will be on a basis of $27 a ton for potassium-chloride, 80 per cent. In case of a disagreement about prices, there is to be arbitration at The Hague.

According to German newspapers, the Alsatian potash producers are planning an enormous development and are expecting large American credits for that purpose. A revolving credit of $6,000,000 is already reported to have been arranged with a New York bank on behalf of German producers. In 1923 potash deliveries to this country exceeded $15,000,000 in value.

The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, October 23, 1924.

THE decision to extend the length of the working week in the American section of the cotton textile industry comes at last as an official admission that the demand for the products of this industry is stronger. Many lines of heavy chemicals are sure to feel the effects before long, for they enter very largely into the various operations involved in the manufacture and finishing of cotton fabrics. Indeed, a more active inquiry for textile chemicals has been in evidence for several weeks. Export business is still only of moderate dimensions. A few lines continue to display weakness, but on the whole quotations are maintained at last week's level.

Heavy Chemicals

Hyposulphite of soda meets with a very small demand and values have an easy tendency; photographic crystals are now quoted at about £14 per ton and commercial quality at £9 to £9 5s. Sulphide of sodium is in much the same position, 60-65 per cent. concentrated solid offering at about £14 5s. and crystals at £9 5s. Caustic soda is firmly maintained and a quietly steady demand is being met with, both from home and foreign users; quotations range from £16 17s. 6d. per ton for 60 per cent. strength to £19 7s. 6d. for 76-77 per cent. Alkali keeps steady and in fair request at £6 15s. per ton. Saltcake is selling very slowly although values are unchanged at £3 10s. per ton. Glauber salts are also a dull section of the market at about the same figure. Bleaching powder is steady but only in moderate inquiry at £10 per ton. Prussiate of soda meets with a slightly improved demand at 3¾d. per lb. Bicarbonate of soda attracts only a small amount of attention, but offers are still on the basis of £10 10s. per ton. Chlorate of soda is easier at 2½d. per lb., the demand for this material being on quiet lines. Soda crystals are rather inactive, but values are unchanged at £5 5s. per ton. Acetate of soda is fairly steady at about £22 10s. per ton, a moderate amount of business being put through. Phosphate of soda is quiet but unchanged from last week at £13 to £13 10s. per ton. Bichromate of potash is well held at 4¼d. per lb., though the demand for this material is not too brisk.

Caustic potash and carbonate of potash are maintained, but business is only on a comparatively small scale; 90 per cent. caustic is offered at £29 to £30 per ton and carbonate at £22 to £23. Chlorate of potash is rather quiet at 2¾d. per lb. Permanganate of potash meets with a restricted demand; prices are a shade steadier at from 6½d. to 7¼d. per lb. according to quality. Bichromate of potash is steady and in fair inquiry at 5½d. per lb. Yellow prussiate of potash is in rather small request though values are unchanged from last week at 6¾d. per lb.

Arsenic values continue weak in the absence of any improvement in the volume of business; current prices for white powdered, Cornish makes, are from £44 to £45 per ton in Manchester. Sulphate of copper is comparatively quiet though steady at £24 10s. to £25 per ton, f.o.b. Commercial Epsom salts meet with a fair amount of inquiry at £4 15s. to £5 per ton, with magnesium sulphate, B.P., still quoted at £6 10s. Acetate of lime is in moderate request at £15 to £15 10s. per ton for grey and round £11 for brown. Acetate of lead is steady at £45 to £46 per ton for white, and £43 for brown. Nitrate of lead is in fair demand at about £42 per ton.

Acids and Tar Products

There is still an absence of movement either in tartaric or citric acid, and values have a weak tendency at 1s. and 1s. 4d. per lb. respectively. Acetic acid is firm and in quietly steady demand at £44 per ton for 80 per cent. commercial, and £68 to £69 per ton for glacial. Oxalic acid is quiet but unchanged at 4d. per lb.

Among the coal-tar products naphthalenes are selling slowly at £15 per ton for refined and from £5 per ton for crude qualities. Pitch is still in small actual demand though prices are rather steadier at 42s. 6d. to 45s. per ton. Solvent naphtha is also stronger at 1s. 2½d. per gallon. Carbolic acid continues quiet and easy at 6d. per lb. for crystals and 1s. 10d. per gallon for crude. Cresylic acid has a weak tendency at 2s. per gallon, but creosote oil is steadier at 5¾d.

Company News

ROSARIO NITRATE CO.—The directors announce an interim dividend of 5 per cent.

SALOR DEL CARMER NITRATE CO.—An interim dividend of 5 per cent., less tax, is announced.

BABCOCK AND WILCOX (LTD.).—The directors have declared an interim dividend of 5 per cent., free of tax.

OLYMPIC PORTLAND CEMENT CO.—An interim dividend of 5 per cent., less tax, is payable on November 15.

BURMAH OIL CO.—The directors announce an interim dividend of 12½ per cent., less tax, on the ordinary shares.

BRITISH PORTLAND CEMENT MANUFACTURERS.—The company have decided to pay an interim dividend at the rate of 10 per cent. per annum for the past half year. A similar interim was paid last year.

LEEDS FIRECLAY CO.—The net profits for the year ended June 30 were £30,827 after providing for debenture interest, and £4,878 was brought forward. A dividend of 5 per cent. is proposed on the ordinary shares, carrying forward £9,704.

ARIZONA COPPER CO.—The directors have resolved to make an interim payment on November 25 of 9d. per share, free of tax, on the ordinary shares of the company on account of the financial year to March 31 next. This payment will be made to those shareholders registered in the books of the company at the close of business on November 1, 1924. The interim distribution last year was 1s. per share, free of tax.

ELECTROLYTIC ZINC CO. OF AUSTRALASIA.—The net profit for the year amounts to £341,350, to which is added £78,262 brought forward, making available £419,612, appropriated as follows: Debenture sinking fund reserve, £11,560; equalisation reserve, £40,000; special amortisation reserve, £100,000; dividends, Nos. 4 and 5, £169,131; balance carried forward, £98,921. Since the close of the period a further dividend on all preference and ordinary shares, absorbing £95,346, has been paid.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

EXPORT TRADE WITH CHINA.—H.M. Commercial Counsellor at Peking will attend at the D.O.T. up to October 31 to interview manufacturers and merchants interested in export trade with China. Interviews by appointment. (Reference No. 5494/T.G.)

CHEMICALS, OILS.—An agent in Christiania desires to secure the representation for Norway of British manufacturers of chemicals, oils, and colourmen's goods. (Reference No. 413.)

CHEMICAL PRODUCTS.—An agent in Paris wishes to represent British firms for the sale of chemical products, especially fertilisers and photographic chemicals. (Reference No. 411.)

ALUMINIUM PAINT.—The Municipal Council of Johannesburg invites tenders, before November 17, for supply of 250 imperial gallons of aluminium paint. A complete copy of conditions can be seen at the D.O.T. (Reference No. B.X./1287.)

CHEMICALS, ETC.—Tenders are invited by the Great Western Railway Co. for the supply of acids, alkalis, pumice, soap, oils, turpentine, colours, mineral oils and spirits, cement, metals, etc. Specifications from office of the Stores Superintendent, Swindon.

PAPERMAKERS' COLOURS.—An agent desires the representation for Sweden of British manufacturers of papermakers' colours. (Reference No. 450.)

TUNGSTEN, MOLYBDENUM, ETC.—A firm in Turin desires to secure the representation of British manufacturers of above goods, and also copper-clad and chrome nickel wire used in the manufacture of electric bulbs. Correspondence in English. (Reference No. 444.)

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information can be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to November 15, 1924.

"UNACHROME."

450,961. For colouring matters and dyestuffs. Class 1. Brotherton and Company, Limited, City Chambers, Infirmary Street, Leeds; chemical manufacturers. August 11, 1924. (To be Associated. Section 24.)

"BONOPHOS."

449,299. For ground mineral phosphate for use as a fertiliser. Hollingshurst and Co., Limited, 41, Trinity Square, London, E.C.3; chemical merchants. June 17, 1924.

"RIVANOL."

451,097. For chemical substances prepared for use in medicine and pharmacy. Farbwerke Vorm. Meister Lucius and Brüning (a Corporation organised under the laws of Germany), Heochst am Main, Germany; manufacturers, August 16, 1924.

"OLESAL."

451,099. For chemical substances prepared for use in medicine and pharmacy. Farbwerke Vorm. Meister Lucius and Brüning (a Corporation organised under the laws of Germany), Hoechst am Main, Germany; manufacturers. August 16, 1924.

"SALYRGAN."

451,100. For chemical substances prepared for use in medicine and pharmacy. Farbwerke Vorm. Meister Lucius and Brüning (a Corporation organised under the laws of Germany), Hoechst am Main, Germany; manufacturers. August 16, 1924.

"ROMAK."

451,696. For chemical substances prepared for use in medicine and pharmacy. Adam Laidlaw, 476, Keppochhill Road, Glasgow; manufacturing chemist. September 9, 1924.

"ISACEN."

451,886. For chemical substances prepared for use in medicine and pharmacy. The Hoffman la Roche Chemical Works, Limited, 7 and 8, Idol Lane, London, E.C.3; manufacturing chemists. September 16, 1924.

"URUNDAY."

449,418. For quebracho extract for tanning purposes. Sociedad Anomina Quebrachales Fusionados (a Joint Stock Company organised under the laws of the Republic of Argentina), Sarmiento 643, and 25 de Mayo 214, Buenos Aires, Argentina; manufacturers. June 19, 1924.

446,458. For sodium cyanide, caustic soda and chloride of lime, being chemical substances for use in manufactures. The Ocean Chemical Co., Ltd., 17, Lower Nuttall, Ramsbottom, Lancashire; chemical manufacturers. March 18, 1924.

Opposition to the Registration of the following Trade Mark can be lodged up to November 22, 1924.

"NUJOL."

446,534. For chemical substances used in manufactures, photography, or philosophical research and anti-corrosives, but not including artists' colours, pigments and mineral dyes, and not including any goods of a like kind to any of these excluded goods. Standard Oil Co. (a corporation organised and existing under the laws of the State of New Jersey), Constable Hook, Bayonne, Hudson County, New Jersey, United States of America; refiners of oil, manufacturers and merchants. March 19, 1924. (To be Associated. Sect. 24.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

INDUSTRIAL CHEMICAL CO., 37, Great Tower Street, E.C., merchants. (C.C., 25/10/24.) £15 8s. 2d. June 19.

WARD AND PARTRIDGE, City Mills, Stratford, paint manufacturers. (C.C., 25/10/24.) £20 17s. 6d. September 18.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

LEWMAN CO., LTD., London, S.E., manufacturers of cleaning preparations, etc. (M., 25/10/24.) Registered October 10, charge, to bank; charged on 121, Gurney Street, Walworth.

TATE (A.), LTD., London, S.W., chemists. (M., 25/10/24.) Registered October 8, £4,500 2nd debentures; general charge (subject to 1st debentures). *£6,000 debentures. April 14, 1924.

TORBAY AND DART PAINT CO., LTD., London, E.C. (M., 25/10/24.) Registered October 13, £100 debentures balance of £1,250; general charge. *£8,750. November 14, 1923.

London Gazette, &c.

Companies Winding Up Voluntarily

ANGLO-LITHUANIAN OIL WORKS, LTD. (C.W.U.V., 25/10/24.) J. Downing, 108A, Cannon Street, London, E.C., appointed liquidator October 1.

BATAVIA OILFIELDS, LTD. (C.W.U.V., 25/10/24.) L. G. Brooks, 3, London Wall Buildings, London, appointed liquidator October 15. Meeting of creditors at liquidator's office, on Friday, October 31, at 11 a.m.

BRITISH EQUATORIAL OIL CO., LTD. (C.W.U.V., 25/10/24.) T. Ford, 37–41, Gracechurch Street, E.C.3, chartered accountant, and G. E. Hounsom, 341, Salisbury House, E.C.2, appointed joint liquidators October 10. Meeting of creditors at 344, Salisbury House, on Thursday, October 30, at 12 o'clock noon.

EVANS (C.), LTD. (C.W.U.V., 25/10/24.) H. Taylor, 1, Booth Street, Manchester, chartered accountant, appointed liquidator October 10.

HOWES' SOAP AND CHEMICAL CO., LTD. (C.W.U.V., 25/10/24.) H. G. Willmott, 147, Corporation Street, Birmingham, Chartered Accountant, appointed liquidator October 17.

INTERNATIONAL OIL LANDS, LTD. (C.W.U.V., 25/10/24.) L. C. Lawson, 3, London Wall Buildings, London, appointed liquidator October 15. Meeting of creditors, at liquidator's office, on Friday, October 31, at 11 a.m.

NORTHAMPTON GLUE CO., LTD. (C.W.U.V., 25/10/24.) T. Collingridge, 4, Langham Place, Northampton, appointed liquidator October 13.

Partnership Dissolved

FOREMAN (J.) AND CO. (Joseph FOREMAN and George WARDLE), dyers and finishers, The Tower Dye Works, Percy Street, Leicester, by mutual consent as from October 6, 1924. Debts received and paid by J. Foreman, who continues the business.

New Companies Registered

BRITISH ESSENCE CO., LTD., 85-86, Glasshouse Street, Vauxhall, London. Distillers, manufacturers and compounders of essences, essential oils and perfumes, etc. Nominal capital, £100 in 1s. shares.

ELY BEET SUGAR FACTORY. Cultivators of and dealers in sugar beet and its products; manufacturers and refiners of and dealers in saccharine, etc. Nominal capital, £300,000 in £1 shares. Solicitors: Morris, Ward-Jones, Kennett and Co., 19-21, Moorgate, London.

STAR LAKE, LTD., manufacturers and refiners of and dealers in all chemical products, resin, turpentine, tallow, oils, greases, etc. Nominal capital, £5,000 in £1 shares. Solicitors: Cobarn and Co., 6, Drapers Gardens, London.

SUTTLES, LEEDS, LTD. Manufacturing chemists and druggists, soap makers, glycerine distillers, drysalters, etc. Nominal capital, £500 in £1 shares. Solicitor: J. E. M. Crowther, 23, Abingdon Street, Westminster.

THE HUMBER FISHING AND FISH MANURE CO., LTD., Winchester Chambers, Stoneferry, Hull. Manufacturers and retailers of fish guano, fish manures, chemical manures, cod liver and other oils, etc. Nominal capital, £135,000 in £1 shares (100,000 7½ per cent. preference and 35,000 ordinary).

Cellulose Holdings Dividend

THE Cellulose Holdings and Investment Company has announced a dividend of 3d. per share, or 25 per cent., tax free, being the first dividend declared by the company which was formed in 1922. Commenting on this announcement *The Times* says:—"While the amount involved is small, the issued Ordinary capital being only about £50,000, the payment is of interest as being the first arising from sales of the products of the British Celanese Co. The Cellulose Holdings and Investment Co. was formed in 1922 to finance the Cellulose (now Celanese) operating company, and in addition to its Ordinary capital the company has outstanding £750,000 debentures, carrying in addition to fixed interest of 7 per cent. one-third of the earnings of the company carried to dividend account. The investments of the holding company include £700,000 7 per cent. debentures of the British Celanese Co., which are receiving their due interest, and 225,000 Midland Electric ordinary shares, the dividend on which was last year 5½ per cent. The company also holds £750,000 preference shares in the Celanese Co.; these are entitled to a cumulative dividend of 7½ per cent., with participating rights, but so far no dividend has been paid. In addition to income from its investments, the holding company is entitled to a royalty of 3 per cent. on the selling price of the whole of the British Celanese Co.'s products until such royalty amounts to £90,000 in each year, when the royalty on any surplus becomes 1 per cent. It would appear that a large proportion of the dividend now declared has been furnished by the proceeds of this royalty."

Van't Hoff Celebrations at Amsterdam.

VAN'T HOFF celebrations are being held to-day (Saturday) in Amsterdam, at which representatives of British chemical associations will be present. Dr. J. H. van't Hoff was actually born in Rotterdam in 1852, and received his doctorate in 1874. In the same year he published, concurrently with the French chemist Le Bel, but independently, a pamphlet suggesting space formulæ to explain the isomerism of optically active forms of lactic and tartaric acids and other compounds. In 1877 van't Hoff became professor of chemistry at Amsterdam with the foundation of the University there, where he remained till 1896, when he went as professor to Berlin. His work as a physical chemist included the enunciation of the fundamental principles of chemical affinity from the thermodynamic point of view, which have proved of the greatest value in understanding chemical changes, and obtaining efficient yields in chemical processes on the industrial scale. Among other things van't Hoff also made valuable contributions on osmotic pressure, and studied the relationships of the Stassfurt potash deposits. He received the first Nobel Prize for Chemistry in 1901. He died in March, 1911. Dr. J. Walker, in his van't Hoff memorial lecture before the Chemical Society, described him as "the greatest chemical thinker of a generation."